Heart Failure in 2020

Zatajivanje srca u 2020.

Heart failure represents one of the most significant diseases due to its high morbidity and mortality, despite the availability of various treatment methods that are being continuously improved. It is more common in older populations, and with the aging of the population it has become a growing global issue. On the other hand, many diseases, especially heart diseases, can manifest as heart failure (HF).

Although those of us who work in the field might feel that the issues surrounding HF are well-known, we can still be surprised by (new) data. Over the last few months, we have witnessed the rise of the COVID-19 (COVID) virus pandemic, that has changed all of our lives and affected many people, in many cases with a lethal outcome. COVID infection primarily affects the respiratory system, but once it has spread it can influence the whole organism via different mechanisms, and HF can also be one of its manifestations, especially in the terminal phase. It should be noted that as many as 80% of patients can have mild or no symptoms while still transmitting the disease. The COVID pandemic has made us face new challenges and taught us or warned us of current problems or of issues that will arise in the near future with regard to both new and previously known infections and diseases.

The working groups of the European Society of Cardiology and Heart Failure Association are continuously developing and implementing numerous activities in addition to providing guidelines and organizing congresses, trainings, and meetings, with the ultimate goal of improving the prognosis of patients with heart failure, and the Croatian Cardiac Society is part of this process. Notably, this participation includes the Heart Failure III Registry, the ATLAS project (with epidemiological data from individual countries), the Heart Failure Awareness Week.
Heart Failure in 2020

Donosimo osvrt na liječenje akutnog i kroničnog ZS-a u doba COVID-19 pandemije.

Smjernice Europskoga kardiološkog društva za dijagnozu i liječenje kardio-vaskularnih bolesti tijekom COVID-19 pandemije s osvrtom na zatajivanje srca

Bolesnici s komorbiditetima češće oboljevaju, uz teži oblik bolesti i veću smrtnost, posebice ako je riječ o kardiovascularnom (KV), respiratornim, bubreznim, malignim bolestima, dijetausu, arterijskoj hipertenziji. U jednom istraživanju (n = 8910) pratili su se oboljeli od COVID-a s obzirom na komorbidity. Smrtnost je iznosila 5,8%, a rizik je bio posebno vezan uz stariju dobu skupinu (>65 godina, 10%; 5,8%), koronarnu bolest srca (CAD, 10,2%; 5,2%), zatajivanje srca (15,3%; 5,6%), krošćun opstruktivnu bolest pluća (14,2%; 5,6%), aritmiju (11,5%; 5,6%) i pušenje (9,4%; 5,6%). KV bolesti su znatno povećavale smrtnost. U metaanalizi 6 studija arterijska hipertenzija i KV bolesti bile su prisutne u 17,1% hospitaliziranih zbog COVID-a, što je rizik od teže kliničke slike povećavalo do 3 puta.

Zahvaćanje srca uobičajeno se prezentira ozljedom i popuštanjem srca, aritmijama, zatajivanjem i fibriolazijom. Kliničke uticaje smrtnosti su možda najbolje ilustrirane na primjeru COVID-a. U jednom obilježenom referentnom centru (n = 1099, pristalih COVID-a, 4 dana, febrilitet – 43%, limfocitopenija – 8,3%, tipične promjene na CT-u pluća 56%), teži oblik bolesti razvio je 6,1% bolesnika (5% je primijećeno u intenzivnu jedinicu, 2,3% je stavljeni na respirator, 1,4% je umrlo). Petina oboljelih ima znakove oštećenja srčanog mišića i tada je smrtnost višestruko veća. U preminulim srce može biti zahvaćeno oko 40% slučajeva, 12% umrlih nije imalo prethodne KV bolesti, dok je 25 – 50% oboljelih od upale pluća imalo komorbiditete.

Bolesnici s infekcijom koronavirusom mogu dobiti novu KV bolest ili se pogoršava postojeća (CAD, kardiomiopatije, srčana insuficijencija raznih uzroka). Zatajivanje srca zna biti posljedica akutnog virusnog miokarditisa i citokinovih kolapsa, ali i rezultat pogoršanja kroničnog ZS-a. Visoki kardimetalabolički zahtjevi u infekciji potiču prekomjeran srčani metabolism i rezultat pejzama srca. Respiratorne infekcije praću hipoksijskim stvaraju veću sklonost smrtnom ishodu. Prosječno se u trećine težih bolesnika može razviti ZS.

Akutno zatajivanje srca

Akutno zatajivanje srca dio je komplikacija kliničkog tijeka infekcije, posebice težih. U podlozi mogu biti akutna ishemija miokarda, infarkt, upala/miokarditis, stresom inducirana kardiomiopatija, tahiarritmija, ARDS, akutna ozljeda bubrega i hipervolemija.

COVID-19 pneumonija vodi u pogoršanje hipoksemijom, dehidracijom i hipoperfuzijom. Klinička slika, komorbiditeti, (this year from May 4 to May 10), and an initiative for general practitioner patient care for patients with HF with the help of specialized medical nurses, and telemedicine support (which was especially useful during the pandemic). In the rest of this article, we will provide a review of the treatment of acute and chronic HF during the COVID-19 pandemic.

Guidelines of the European Society of Cardiology for the diagnosis and treatment of cardiovascular diseases during the COVID-19 pandemic in relation to heart failure

Patients with comorbidities are infected by COVID more often with a higher disease severity and mortality, especially if the comorbidity involves cardiovascular (CV), respiratory, renal, or malignant diseases, diabetes, and arterial hypertension. One study (n=8910) followed patients with COVID based on comorbidities. The mortality was 5.8%, and the risk was especially pronounced in the older age group (>65: 10%; 5.8%). In coronary artery disease (CAD, 10.2%; 5.2%), heart failure (15.3%; 5.6%), chronic obstructive pulmonary disease (COPD, 14.2%; 5.6%), arrhythmia (11.5%; 5.6%), and smoking (9.4%; 5.6%). CV diseases significantly increased mortality. In a meta-analysis of 6 studies, hypertension and CV diseases were present in 17.1% of those hospitalized for COVID, with up to 3 times higher risk of higher disease severity.

COVID affecting the heart usually manifests as cardiac damage and heart failure, arrhythmia, and cardiac arrest. Different signs of infection can be prevalent in patients with COVID (high fever, muscle and joint pain, sore throat, headache, fatigue, skin changes, smell and taste disorders, and disorders of the digestive and urinary systems), and breathing problems accompanied by chest pain are common, which can resemble myocardial infarction. All known clinical methods must be used to establish a diagnosis. If performed, coronaryography is usually normal. In a study on patients with COVID from China (n=552 hospitals, n=1099, average incubation – 4 days, feverity – 43%, lymphocytopenia 83.2%; typical changes observed on lung CT 56%), the severe form of the disease was observed in 6.1% of patients (5% were admitted to intensive care, 2.3% were placed on a respirator, and 1.4% died). A fifth of the infected had signs of myocardial damage, in which case the mortality rate was seven times higher. In the deceased, the heart was affected in about 40% of cases, 12% did not have prior CV diseases, whereas 25-50% of patients with pneumonia had comorbidities.

Patients with COVID-19 infection can develop a new CV disease or present with progression of an existing disease (CAD, cardiomyopathies; various form of HF). Heart failure can be the consequence of acute viral myocarditis and a “cytokine storm”, but also the result of exacerbation of chronic HF. The high cardio-metabolic burden during infection causes overwork of the heart, while cytokines can exacerbate shock and circulation changes, including the coronary vessels and microthrombosis. Respiratory infections accompanied by hypoxia lead to a higher incidence of mortality outcomes. Approximately one third of patients with the severe form of the infection can develop HF.

Acute heart failure

Acute heart failure is one of the possible complications in the clinical course of COVID infection, especially in more severe cases. The underlying condition can be acute myocardial ischemia, infarction, inflammation/myocarditis, stress-induced
slikovne metode i povećani natriuretski peptidi (NP) mogu pomoći u dijagnozi COVID-19 pneumonije i laboratorijskih nalazih (viša sedimentacija, fibrinogen, CRP i limfocitopenija) mogu pomoći u dijagnozi COVID-19 pneumonije i laboratorijskih nalazih (viša sedimentacija, fibrinogen, CRP i limfocitopenija) mogu pomoći u dijagnozi COVID-19 pneumonije i laboratorijskih nalazih (viša sedimentacija, fibrinogen, CRP i limfocitopenija) mogu pomoći u dijagnozi COVID-19 pneumonije i laboratorijskih nalazih (viša sedimentacija, fibrinogen, CRP i limfocitopenija). Zbog male RTG senzitivnosti katkad se primjenjuje MSCT koronarografija (MR) može se upotrebljavati za dodatnu dijagnostiku. Endomyocardialna biopsija ne preporučuje se u bolesnika s COVD-19 i akutnim ZS-om. Oslikavanje MSCT koronarografijom poželjno je primijeniti (treba paziti da se infekcija ne prenese na osoblje i uređaje). Podaci su o akutnom ZS-u uz infekciju koronavirusom rijetki. Prema jednom izvješću u 23 % svih hospitaliziranih razvija se ZS; ZS je znatno zastupljen dijagnoza pri smrtnim ishodima u usporedbi s onima koji su preživjeli (52 % prema 12 %, P< 0.0001).

Nekoliko je mehanizama kojima se razvija akutno ZS u bolesni COVID-19, poput:

1) akutna ozljeda miokarda (promjene troponina, EKG-a, TTE) pojavljuje se u 8 % bolesnika. Uzroci mogu biti ishemija, infarkt, miokarditis. U težoj infekciji, ozljeda miokarda biželi se u 22,2 – 31 %. Metaanaliza četiri studije (n = 341) opisuje da je u bolesnika s teškom infekcijom, proponin mno go veći pri prijmu, ostaje viši u onih koji nisu preživjeli, a povećava se pogoršanjem bolesti. ZS je češći u bolesnika s akutnom ozljedom miokarda (14,6 % prema 1,5 %) uz povećanje vrijednosti NT-proBNP-a.

2) prateće bolesti mogu pridonijeti razvoju ZS-a (ako što su ARDS, hipoksemija, akutna ozljeda bubrega,hipovolemija, stresnom inducirana kardiomiopatija, sustavna inflamacijska aktivacija – „citokinska oluja”, teška infekcija uz multi-organsku disfunkciju).

3) aritmija može voditi do pogoršanja funkcije srca. Biželi se u 16,7 % svih hospitaliziranih bolesnika s CPUVD-om i u 44,4 % onih koji su zahtijevali intenzivnu skrb.

Ograničeni podatci opisuju da infekcija sa SARS-CoV-2 zna uzrokovati fulminantan miokarditis. Na dijagnozu se može posumnjati kod akutnog početka prsnog bola, promjena u elektrokardiogramu (EKG-a) kod bolesnika sa ZS-om, uz stariju životnu dob i komorbiditet. Za bolesnika sa teškim infekcijama pri želji izvršiti TTE vazdušnu dilataciju lijeve klijetke (LV) uz globalnu hipokontraktilnost, znatno povećan troponin i NP, bez sigurnih promjena koronarnih arterija. Sumnja na miokarditis trebala bi se pojaviti u bolesnika s COVID-19 i akutnim ZS-om. Oslakavanje MSCT koronarografijom poželjno je primijeniti kod bolesnika sa ZS-om. Arhythmija može voditi do pogoršanja funkcije srca. Biželi se u 8 % bolesnika.

Kronično zatajivanje srca

Rizik od infekcije koronavirusom (COVID-19) može biti visok u bolesnika sa ZS-om, uz stariju životnu dob i komorbiditet. For dijagnostiku se primjenjuje niz pretraga: mjerenje temperature (nekontaktnim uređajima), EKG (aritmija, miokardijalna ishemija, miokarditis), RTG prsnog koša (kardiomegalija, COVID-19 pneumonija) i laboratorijski nalazi (viša sedimentacija, fibrinogen, CRP i limfocitopenija) mogu pomoći u dijagnozi. Zbog malo RTG senzitivnosti katkad se primjenjuje MSCT pluća kako bi se otkrila pneumonija. TTE je vrlo važan da bi se ponašala disfunkcija LV-a i uočio miokarditis. U svemu je bitno spriječiti prijenos virusa. Bolesnici s kroničnim ZS-om trebaju se držati zaštitnih mjera (maska, rukavice, higijena ruku, socijalna distancija, dezinficiranjem, samozaličaju), a u stabilnoj fazi bolje je izbjeći kontrole u bolnici. Koliko je moguće, trebalo bi koristiti se telemedicinom (internetom, telefonom). Ona pomaže manjim transmisijama virusa pri prenačenju cardiomypathy, tachyarrhythmia, acute respiratory distress syndrome (ARDS), acute kidney injury, and hypovolemia.

COVID-induced pneumonia leads to deterioration of the patient's condition due to hypoxemia, dehydration, and hypofusion. The patient's clinical presentation, comorbidities, imaging methods, and elevated natriuretic peptides (NP) can indicate HF. Application of a bedside transthoracic echocardiogram (TTE) is important for the diagnosis (care should be taken not to transmit the infection to the staff and device).

Data on acute HF with COVID infection are lacking. In one report, 23% of all hospitalized patients developed HF, and HF was a significantly prevalent diagnosis in mortal outcomes in comparison with those who survived the infection (52% vs. 12%, P< 0.0001).

There are several mechanisms that cause the development of acute HF in COVID infection, such as:

1) Acute myocardial injury (changes in troponin levels, ECG, TTE) manifests in 8% of patients. The causes can be ischemia, infarction, or myocarditis. In severe infections, damage to the myocardium was reported in 22.2-31.0% of patients. A meta-analysis of 4 studies (n=341) reported that troponin was already significantly elevated on hospital admission in patients with severe infection, that it remained higher in those who survived the infection, and that troponin levels increased as the disease became more severe. HF was more common in patients with acute myocardial damage (14.6% vs. 1.5%), with elevation of NT-proBNP levels.

2) Comorbid diseases can contribute to the development of HF (such as acute respiratory distress syndrome, hypoxemia, acute kidney injury, hypovolemia, stress-induced cardiomyopathy, systemic inflammatory activation – a "cytokine storm"; or severe infection with multi-organ dysfunction).

3) Arrhythmia can lead to deterioration of heart function. It has been reported in 16.7% of all hospitalized COVID patients and in 44.4% of those who required intensive care.

The limited data we have indicate that SARS-CoV-2 infection can lead to fulminant myocarditis. This diagnosis can be suspected in case of acute onset of chest pain, ECG changes, arrhythmia, and hemodynamic instability. Dilatation of the left ventricle (LV) can usually be observed, along with global hypokontraktilnost, significantly elevated troponin and NP values, but with no significant changes in the coronary arteries. Myocarditis should also be suspected in patients with COVID-19 and HF. Imaging using MSCT coronaryography is desirable when we want to exclude CAD comorbidity. Magnetic resonance imaging (MR) can be used as an additional diagnostic tool. Endomyocardial biopsy is not recommended in patients with COVID. The exact mechanism of this myocarditis is still unclear.

Chronic heart failure

Risk of COVID-19 infection can be high in patients with HF, as well as those at an advanced age and with comorbidities. A number of tests are used in diagnosis: body temperature measurement (with non-contact devices), ECG (arrhythmia, myocardial ischemia, myocarditis), chest X-ray (cardiomegaly, COVID-induced pneumonia), and laboratory tests (elevated erythrocyte sedimentation rate, fibrinogen, CRP, and lymphocytopenia) can facilitate establishment of the diagnosis. Due to low chest X-ray sensitivity, chest MSCT scan is used to discover pneumonia. TTE is very important to show LV dysfunction and spot myocarditis. During all of the above, it is important to prevent virus transmission. Patients with chronic HF
stabilnih bolesnika. Preporučuje se potpora psihologa i dosta-
va lijekovu kući.
SARS-CoV-2 koristi se ACE2 receptorima za ulazak u sta-
nicu, tako da neki podatci navode da angiotenzin receptor blokatori (ARB) i inhibitori angiotenzin konvertirajućeg enzi-
ma (ACEI) mogu povećati broj ACE2 receptorova, što hipotetski povećava sklonost infekcija. Istraživanje među 12 bolesni-
ka s COVID-om i 1 ARDS-om pokazuje da se plazma Ang II znatno povećava uz virusnu infekciju i ozljedu pluća. Time liječenje ARB grupom lijeкова može imati povećan učinak na suzbijanje Ang II posredovane ozljede pluća. Dosad dostupni podatci upućuju na to da terapiju u kroničnih bolesnika sa ZS-
om preporuču smjernicama (ACEI, ARB, beta blokatori-βB, sakubitril/valsartan, antagonist mineralokortikoidnih recep-
tora-MRA) treba nastaviti neovisno o COVID-19. Prekidanje kronične terapije može uzrokovati pogoršanje ZS-12,13. Očekuju se daljnja istraživanja o ulozi ACE/ARB u ovoj bolesti.
Bolesnici s LVAD-om, kao i oni s transplantacijom posebno su osjetljivi na infekcije, pa bi trebalo striktno provoditi pre-
ventivne mjere prijenosa virusa. Malo je publikacija o oboje-
lima s transplantacijom uz COVID-19; dostupne su neke uzarazu SARS-om i MERS-om.12,13-16

should adhere to protective measures (masks, medical gloves, hand hygiene, social distancing, disinfectants, self-isolation), and hospital checkups should be avoided during the stable phase. Telemedicine (internet, phone) should be used as much as possible. This helps reduce virus transmission while moni-
toring stable patients. Support from psychologists and home delivery of medication is recommended.

SARS-CoV-2 uses ACE2 receptors to enter the cell, and some data indicate that angiotensin receptor blockers (ARB) and an-
giotensin-converting-enzyme inhibitors (ACE inhibitors) can increase the number of ACE2 receptors, which might hypotheti-
cally increase susceptibility to infection.1 A study on 12 patients with COVID-19 infection and ARDS showed that plasma angio-
tensin II was significantly increased with viral infection and damage to the lungs.10 Therefore, treatment with the ARB group of medica-
tions can have a beneficial effect on suppressing angiotensin II-mediated lung damage. Data available so far indicate that treat-
tment in chronic patients with HF according to guideline recommendations (ACE inhibitors, ARB, beta-blockers, sakubitril/valsartan, aldosterone receptor antagonists) should be continued regardless of COVID infection.2,3 Termination of chronic therapy can lead to HF deterioration.2 Further research on the role of ACE inhibitors and ARB in this disease is expected.

Patients with a left ventricular assist device (LVAD) and with heart transplants are especially susceptible to infections, and strict adherence to preventive measures against virus trans-
mission is necessary. There have been few publications on transplant patients with COVID-19 infection; some studies with SARS and MERS infection are available.13-16

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