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Abstracts

COVID 19

265 Incidence, determinants and prognostic relevance of HS-troponin and natriuretic peptides elevation at admission in hospitalized COVID-19 pneumonia patients

Luca Arcari[1], Michelangelo Luciano[3], Luca Cacciotti[1], Maria Beatrice Musumeci[5], Valerio Spuntarelli[3], Eleonora Pistella[2], Dario Martolini[3], Daniele Manzo[1], Mariateresa Pucci[1], Claudio Marone[2], Serena Melandri[2], Gerardo Ansalone[1], Claudio Santini[2], Paolo Martelletti[3], Massimo Volpe[1], and Luciano De Biase[4]
[1]UNITÀ di Cardiologia, Ospedale Madre Giuseppina Vannini, Roma, [2]Unità di Medicina Interna, Ospedale Madre Giuseppina Vannini, Roma, [3]Unità di Medicina Interna, Facoltà di Medicina e Psicologia, Sapienza Università di Roma, [4]Unità Scompenso Cardiaco, Facoltà di Medicina e Psicologia, Sapienza Università di Roma, [5]Unità di Cardiologia, Facoltà di Medicina e Psicologia, Sapienza Università di Roma

Aims: myocardial involvement in the course of Coronavirus disease 2019 (COVID-19) pneumonia has been reported, though not fully characterized yet. Aim of the present study is to undertake a joint evaluation of hs-Troponin and natriuretic peptides (NP) in patients hospitalized for COVID-19 pneumonia.
Methods and results: in this multicenter observational study, we analyzed data from $n = 111$ COVID-19 patients admitted to dedicated "COVID-19" medical units. Hs-Troponin was assessed in $n = 103$ patients and NP in $n = 82$ patients on admission; subgroups were identified according to values beyond reference range. increased hs-Troponin and NP were found in 38% and 56% of the cases respectively. As compared to those with normal cardiac biomarkers, these patients were older, had higher prevalence of cardiovascular diseases (CVD) and more severe COVID-19 pneumonia by higher CRP and D-dimer and lower PaO2/FIO2. Two-dimensional echocardiography performed in a subset of patients ($n = 24$) showed significantly reduced left ventricular ejection fraction in patients with elevated NP only ($p = 0.02$), whereas right ventricular systolic function (tricuspid annular plane systolic excursion) was significantly reduced both in patients with high hs-Troponin and NP ($p = 0.022$ and $p = 0.03$ respectively). On multivariable analysis, independent associations were found of hs-Troponin with age, PaO2/FIO2 and D-dimer ($B = 0.419$, $p = 0.001$; $B=-0.212$, $p = 0.013$ and $B = 0.179$, $p = 0.037$ respectively), and of NP with age and previous CVD ($B = 0.480$, $p < 0.001$ and $B = 0.253$, $p = 0.001$ respectively). In patients with in-hospital mortality ($n = 23$, 21%) hs-Troponin and NP were both higher ($p = 0.001$ and $p = 0.002$ respectively), while increasing hs-troponin and NP were associated with worse in-hospital prognosis [OR 4.88 (95% CI 1.9-12.2), $p = 0.001$ (adjusted OR 3.1 (95% CI 1.2-8.5), $p = 0.025$) and OR 4.67 (95% CI 2.1-10.8), $p < 0.001$ (adjusted OR 2.89 (95% CI 1.1-7.9), $p = 0.04$) respectively]. Receiver operator characteristic curves showed good ability of hs-Troponin and NP in predicting in-hospital mortality (AUC $= 0.869$ $p < 0.001$ and AUC $= 0.810$, $p < 0.001$ respectively).
Conclusion: myocardial involvement at admission is common in COVID-19 pneumonia and associated with worse prognosis, suggesting a role for cardiac biomarkers assessment in COVID-19 risk stratification. Independent associations of hs-Troponin with markers of disease severity and of NP with underlying CVD might point towards existing different mechanisms leading to their elevation in this setting.

235 Percutaneous urgent treatment of severe aortic stenosis in a patient during SARS-CoV-2 pandemic: role of balloon aortic valvuloplasty

Tiziana Attisano[1], Angelo Silverio[2], Michele Bellino[2], FrancescaMaria Di Muro[1], Cesare Baldi[1], Enrico Coscioni[3], Gennaro Galasso[1,2], and Carmine Vecchione[2]
[1]Interventional Cardiology Unit Cardiovascular and Thoracic Department Aou S. Giovanni di dio E Ruggi D'aragona Salerno Italy, [2]University Cardiology Unit Aou S. Giovanni di dio e Ruggi D'aragona Salerno Italy, [3]Cardiothoracic Surgery Unit Cardiovascular and Thoracic Department Aou S. Giovanni di dio e Ruggi D'aragona Salerno Italy

Aims: The majority of transcatheter aortic valve implantation (TAVI) procedures are performed on an elective basis and, therefore, have been postponed during Coronavirus disease 2019 (COVID-19) outbreak. However, delay in the treatment of severe aortic stenosis (AS) may increase the risk of adverse events, particularly in elderly patients with multiple comorbidities.
Methods and results: An 86-year-old man, affected by severe AS was referred to our Institution from a spoke centre due to decompensated heart failure refractory to optimal medical therapy. Three months before, the patient was evaluated by our Heart Team and was scheduled for TAVI. Since that time, he had been waiting for elective TAVI procedure, which was postponed due to the COVID-19 outbreak spark.

Due to the clinical and computed tomography suspicion of SARS-CoV-2 infection he underwent nasopharyngeal swab and was temporarily isolated.
However, the rapid deterioration of clinical and hemodynamic conditions required emergency treatment. We performed a balloon aortic valvuloplasty (BAV) as a bridge for TAVI, and achieved a reduction of the invasive transaortic gradient from 43 to 10 mmHg after one inflation. The patient's clinical and hemodynamic conditions markedly improved within a few hours; the next day, the result of the reverse-transcriptase polymer chain reaction for COVID-19 was negative. At day five, he underwent TAVI procedure with implantation of a CoreValve Evolut[TM] Pro 29. Subsequent clinical course was uneventful.
Conclusion: In the context of COVID-19 pandemic, the deferral of TAVI procedure should be assessed on a case-by-case basis in order to avoid delay in patients at high risk for adverse events.
BAV may be an option in heart failure patients with severe AS when TAVI is temporarily contraindicated such as in patients suspected for COVID-19.

402 Impact of RAAS inhibitors on clinical outcome and mortality in STEMI patients during the COVID-19 era: a multicentre observational study

Lucia Barbieri[1], Daniela Trabattoni[2], Giulio Stefanini[3], Enrico Vizzardi[4], Gabriele Tumminello[1], Emilio Assanelli[2], Marianna Adamo[4], Carlo Andrea Pivato[3], Giovanni Provenzale[1], Domitilla Gentile[1], Marco Metra[4], and Stefano Carugo[1]
[1]Asst Santi Paolo Carlo, [2]Centro Cardiologico Monzino, [3]Humanitas IRCCS Rozzano, [4]Spedali Civili di Brescia

Aims: Conflicting results are available regarding the influence of ACEi/ARBs on the risk of COVID-19 infection, while less is known about their impact on clinical outcome of STEMI patients with confirmed diagnosis of COVID-19. Our aim was to evaluate the impact of ACEi/ARBs therapy on in-hospital mortality and clinical outcomes of STEMI patients during COVID-19 pandemic.
Methods and results: We retrospectively analysed consecutive STEMI patients hospitalised from February 20, to May 10, 2020 at four Hospitals in Lombardy. SARS-COV-2 diagnosis was performed by nasopharingeal swab test. Procedural outcome, respiratory complications and in-hospital mortality were reported. Univariate and multivariate analysis were performed by logistic regressions. Our population was represented by 182 STEMI patients, 76.9% male, mean age 67+/-12.5. Hypertension was reported in 53.3%, treated with ACEi/ARBs in 29.1%. COVID-19 diagnosis was confirmed in 17.1%. In-hospital mortality (13.2%) was significantly higher in COVID-19 patients (31% vs 10%, $p = 0.003$), even if ejection fraction (OR 0.93[95%CI]0.87-0.99; $p = 0.03$) and respiratory complications (OR 9.39[95%CI]1.91-45.9; $p = 0.006$) result the only two independent predictors. The incidence of COVID-19 infection was not influenced by ACEi/ARBs (16.5% in naïve vs 18.8%) whose presence at admission did not correlate with respiratory complications or mortality both in case of discontinuation or manteinance.
Conclusion: In a high-risk population, such as that of STEMIs, the potential benefit of ACEi/ARBs discontinuation in COVID-19 patients is overcome by its detrimental effect. Intensive care, additional preventive respiratory investigations, regardless from swab test result, should be suggested among all patients admitted for STEMI during pandemic.

101 Human mesenchymal stromal cells do not express ACE2 and TMPRSS2 and are not permissive to SARS-CoV-2 infection

Manuela Mura[2], Francesca Bastaroli[1], Giulia Nykjaer[1], and Massimiliano Gnecchi[1,2]
[1]Dipartimento di Medicina Molecolare, Università Degli Studi di Pavia, [2]Unità di Terapia Intensiva Coronarica e Laboratorio di Cardiologia Sperimentale, Fondazione IRCCS Policlinico San Matteo

Aims: Cell-based therapy has been proposed for the treatment of both pulmonary and cardiac damage derived from SARS-CoV-2 infection. Mesenchymal stromal cells (MSCs) have acquired particular interest for the well documented immunomodulatory functions. However, some critical issues regarding the possibility that MSCs could be infected by the virus have been raised. Angiotensin-converting enzyme 2 (ACE2) and TMPRSS2 are the main host cell factors for the Severe Acute Respiratory Syndrome-Coronavirus 2 (SARS-CoV-2) entry. To this purpose, we evaluated if human MSCs from both Foetal and adult tissues constitutively express ACE2 and TMPRSS2, and if they can be infected by SARS-CoV-2.
Methods and results: We studied 8 hMSC lines: 4 of Foetal origin isolated from human placentas (hA-MSC) and 4 of adult origin isolated from bone marrow aspirates

(hBM-MSCs). The lung epithelial cancer cell line Calu-3, which expresses high levels of ACE2 and TMPRSS2, and is permissive to SARS-CoV-2, was used as positive control. We quantified ACE2 and TMPRSS2 mRNA levels by RT-qPCR and verified protein content by western blot on both cell lysates and serum-free 48 hrs-conditioned media (MSC-CM). ACE2 levels in MSC-CM were also quantified by ELISA assay. Finally, to test MSC viral susceptibility, we produced replication-defective, GFP-tagged retroviral particles bearing the SARS-CoV-2 Spike envelope protein; the pantropic VSV glycoprotein (VSV-G) was used as positive control. ACE2 and TMPRSS2 mRNA levels in both amniotic and bone marrow MSC were about 400-fold and 250-fold lower respectively compared with Calu-3. ACE2 and TMPRSS2 protein expression were undetectable by western blot in MSC lysates. Moreover, we were not able to detect any soluble ACE2 in MSC conditioned media both by western blot and ELISA. Finally, Calu-3 but not MSC were infected by SARS-CoV-2 Spike pseudovirus, whereas both cell types were susceptible to VSV-G pseudovirus infection.

Conclusion: Both Foetal and adult MSC do not express biologically significant levels of ACE2 and TMPRSS2 and are refractory to SARS-CoV-2 infection. These data support MSC-based approaches in COVID-19 patients, even in the acute phase of disease, as a possible useful approach to mitigate the cytokine storm complicating the most severe cases of the disease.

507 Impact of the COVID-19 pandemic on clinical outcomes of ACS: retrospective analysis from a cardiology network in Abruzzo, Central Italy

Lorenzo Belli[2], Matteo De Rosa[2], Antonio Oliva[1], Simone Grassi[1], Marcello Caputo[4], Cristian DOvidio[3], Piersante Pierdomenico[2], and Jacopo Pizzicannella[4]
[1]Legal Medicine, Department of Health Surveillance and Bioethics, Università Cattolica del Sacro Cuore, Rome, Italy, [2]Department of Medical, Oral and Biotechnological Sciences, University" G. D'annunzio", Chieti-Pescara, Italy, [3]Legal Medicine, University" G. D'annunzio", Chieti-Pescara, Italy, [4]ASL02 Lanciano-Vasto-Chieti, SS. Annunziata Hospital, Chieti, Italy

Aims: The reorganization of healthcare services due to the COVID-19 pandemic has radically changed the management of inpatients and outpatients affected by cardiovascular disorders. Moreover, several authors worldwide have reported a significant decrease in hospital admissions for acute coronary syndromes (ACS) during the most recent months of the COVID-19 outbreak. To prepare for a second wave of the pandemic, the causes of this pattern and its impact on patients and hospital management have been studied.

Methods and results: We conducted a monocentric, observational, retrospective study aimed at evaluating consecutive patients discharged from our local network with a diagnosis of ACS from the 20th of February 2020 to the 30th of April 2020. A total of 201 patients with ACS were included in the analysis. All patients with ACS in 2020 were free of Sars-nCoV2 infection. Seventy-two ACS cases occurred during the February 20-April 30, 2020 period, while 129 were recorded in the same period of 2019 (44.4% reduction). In particular, the number of patients with NSTE (Non-STelevation)-ACS dropped from 84 (65%) in 2019 to 21 (44,4%) in 2020 (62% reduction, p = 0,01), while more patients with a diagnosis of STEMI (ST elevation myocardial infarction) were admitted in 2020. Thirty-eight composite events (mortality, life-threatening arrhythmias, mechanical complications and acute heart failure) were observed in 2020, while only 34 patients were free from events. Conversely, in the 2019 ACS group, 37 events were recorded, while 92 patients did not develop any events (RR 1,82; 1,29- 2,6 95% CI; p = 0,01).

Conclusion: It is still matter of debate why the incidence of ACS has decreased during the COVID-19 pandemic, and the fear of seeking medical aid in high-risk environments such as hospitals has been proposed as a possible explanation. However, the delay in diagnosis and treatment of these patients has a significant impact on public health costs and sustainability of care, since delayed diagnosis has been shown to be associated with a significant increase in short-term complications and deaths. Public health messaging and proper healthcare services organization should play a crucial role in adjusting the system to the new needs of public health.

503 STEMI and primary PCI during COVID-19 pandemic peak phase in Italy: patient and system delays to reperfusion

Giulia Masiero[1], Giovanni Maria Vescovo[1], Alice Benedetti[1], Livio D'Angelo[1], Luca Nai Fovino[1], Alessandro Zorzi[1], Chiara Fraccaro[1], Andrea Pavei[1], Massimo Napodano[1], Luisa Cacciavillani[1], and Giuseppe Tarantini[1]
[1]Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padua Medical School, Padua, Italy

Timely reperfusion with primary percutaneous coronary intervention (pPCI) improves outcomes in patients with ST-segment elevation myocardial infarction (STEMI). The efficiency of the primary percutaneous coronary intervention (pPCI) system during the COVID-19 pandemic in terms of reperfusion delay and clinical results has been slightly evaluated. The implementation of dedicated measures to minimize the risk of nosocomial transmission and the patient's perception of an increased risk of in-hospital infection have to be taken into account.

In an Italian institution an internal protocol to minimize the risk of COVID-19 nosocomial transmission was implemented since the beginning of the outbreak. Therefore, we assess and characterize ischaemic time and outcome of ST-elevation myocardial infarction (STEMI) patients treated with pPCI at an Italian hub centre during the peak phase of the outbreak (n = 85) compared to those treated during the same three months period in 2019 (n = 67), with a 21% drop of STEMI cases rate. Patients with cardiogenic shock and out-of-hospital cardiac arrest were excluded. Baseline characteristics and comorbidities were similar in both groups, except for a higher rate of male in 2019. Compared to previous year, we highlighted a significantly longer total reperfusion delay in 2020 STEMI patients mainly due to pre-hospital delay, and a trend with higher in-hospital mortality rate with an increased rate of acute myocardial infarction (AMI) related complications. Since no hospital system reperfusion delay was found in STEMI patients admitted during the peak phase of the pandemic, we suggested that a dedicated COVID-19 protocol did not affect quality of in-hospital life-saving procedures.

360 In-hospital cardiovascular evaluation of COVID-19 patients during SARS-CoV-2 pandemic: results from a systematic approach

Lucia Ilaria Birtolo[1], Viviana Maestrini[1], Nicola Galea[2], Paolo Severino[1], Fabio Infusino[1], Gioacchino Galardo[3], Giancarlo Ceccarelli[4], Francesco Alessandri[6], Paolo Palange[5], Maria Chiara Colaiacomo[7], Claudio M Mastroianni[4], Cristina Chimenti[1], Andrea Frustaci[1], Gabriella DEttorre[4], Franco Ruberto[6], Carlo Catalano[2], Francesco Pugliese[6], Marco Francone[2], Massimo Mancone[1], and Francesco Fedele[1]
[1]Department of Clinical, Internal, Anesthesiological and Cardiovascular Sciences, Sapienza University of Rome, [2]Department of Radiological, Oncological and Pathological Sciences, Sapienza University of Rome, [3]Emergency Department-Azienda Ospedaliera Universitaria Policlinico Umberto I Rome, [4]Department of Public Health and Infectious Diseasessapienza University of Rome, [5]Department of Clinical and Molecular Medicine, Division of Respiratory Diseases, Policlinico Umberto I, Sapienza University of Rome, [6]Department of Anesthesia and Intensive Care Medicinsapienza University of Rome, [7]Radiology Dea Department, Umberto I Hospital, Sapienza University of Rome

Aims: An increasing number of evidences, limited to sporadic cases or to echocardiography evaluation, reported that cardiovascular involvement is common in COVID-19 patients. Aim of this study was to assess the occurrence of cardiovascular diseases (CD) in confirmed COVID-19 patients admitted to hospital by clinical evaluation including Focus Cardiac UltraSound (FoCUS), integrated by further examinations when indicated.

Methods and results: During an interval time of 30 days, n = 76 consecutive confirmed COVID-19 patients were undergone to cardiovascular evaluation within 48 hours from admission to our hospital. Twelve-standard electrocardiogram (ECG), high-sensitive Troponine and FoCUS evaluation by portable ultrasound were performed integrated by further test if clinically indicated. Baseline characteristic, arterial-blood gas, blood test, chest computed tomography and treatment were recorded. CD was defined as the occurrence of a new cardiovascular disease during
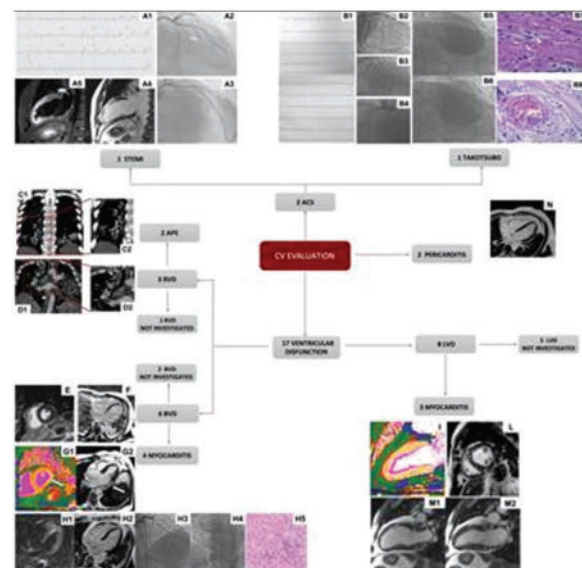

Figure 1. The figure shows a summary of cardiovascular events occurred during COVID-19 hospital admission.

the hospitalization for COVID-19. On the overall cohort 28% had CD. A final diagnosis was reached in 13 patients: acute myocarditis (n = 7) and pericarditis (n = 2), acute pulmonary embolism (n = 2), Takotsubo's syndrome (n = 1), myocardial infaction (n = 1). Ventricular dysfunction was identified in other 8 patients but further test could not be performed due to instable condition/death, acute renal failure, patients refusal. Death occurred more often in patients presenting with CD compared to patients without CD (29% vs. 5%, p = 0.011).

Conclusion: Systematic cardiac evaluation during hospitalization for COVID-19 revealed the occurrence of a wide spectrum of cardiac conditions. Death occurred more often in patients with cardiovascular condition. FoCUS scan was easy and quick to perform and useful to screen patients requiring further test.

467 Aggressive, multisite vascular complications in COVID-19 infection: a case report

Andrea Boccatonda[1], Damiano D'Ardes[1], Giulio Cocco[1], Cosima Schiavone[1], Maria Teresa Guagnano[1], Francesca Santilli[1], Marco Bucci[1], Gianfranco Lessiani[1], and Francesco Cipollone[1]
[1]UNIVERSITÀ DEGLI STUDI G.D'ANNUNZIO CHIETI-PESCARA

Aims: COVID-19 has relevant cardiovascular implications, and patients with previous cardiovascular disease display an higher risk for detrimental outcomes.

Methods and results: A 68-years old female patient was admitted to the emergency department complaining fever (38° C) for seven days, dyspnoea and neurological deficit (aphasia and hemiplegia). Her past medical history was characterized by hypertension, bilateral carotid and mild peripheral artery disease (PAD). Home drug therapy was: aspirin and beta-blocker. Chest X-ray showed an infiltrative opacity and interstitial thickening prevalent on the inferior left lung. A nasopharyngeal swab was obtained resulting positive for Sars-Cov-2. Head CT showed acute lacunar infarction in the temporal right region. The day after, an electrocardiogram showed a posterolateral myocardial infarction (MI) with ST elevation (STEMI for monovasal arterial occlusion) which required urgent intervention (percutaneous coronary intervention (PCI) using drug-eluting stents (DES) on circonflex coronary artery). Blood tests showed: mioglobin 449.0 ng/mL; Hs-troponin I 2406.0 pg/mL; aPTT 37 SEC.; PT/INR 1.22, CK MB 23.50 ng/dL; BNP 1292.0 pg/dL. After few days, lower limb PAD showed a very critical progression to necrosis of the feet (more relevant on the right foot) who required a partial amputation of the right foot. After 1 month, the patient experienced a moderate recovery with a susbstatial resolution of pneumonia.

Conclusion: Sars-CoV-2 induces blood hypercoagulabilty and severe inflammation, thus leading to an increased risk of vascular injury and thrombosis.

568 STEMI in lockdown period: first outcomes from Italian real world COVID-19

Michela Bonanni[1], Andrea Bezzeccheri[1], Martino Baluci[1], Enrichetta Dato[1], Saverio Muscoli[1], Daniela Benedetto[1], Giuseppe Stifano[1], Massimiliano Macrini[1], Alessio Di Landro[1], Marco Di Luozzo[1], Massimo Marchei[1], Enrica Giuliana Mariano[1], Linda Cota[1], Francesco Romeo[1], and Valeria Cammalleri[1]
[1]UOC Cardiologia, Policlinico tor Vergata, Roma

Aims: The aim of our study is to evaluate the impact on ST-segment elevation myocardial infarction (STEMI) care during the Coronavirus Virus Disease 2019 (COVID-19) pandemic, through the analysis of cases of patients with STEMI who underwent percutaneous coronary intervention (PCI) at our department.

Methods and results: We performed an observational study on early data collected during social restrictions of Italian Government in our PCI centre with 24/7 on-site interventional cardiologist availability. All consecutive patients affected by STEMI, from March, 9 to May, 4 2020, were collected and compared with STEMI treated during the same period of 2019. During the lockdown, we observed a 55% reduction of STEMI patients admitted to our catheterization laboratory, when compared to the same period of 2019 (26 vs 47 patients). Changes in all time components of STEMI care were notably observed, particularly for longer median times of symptom-to-first medical contact [382 minutes (IQR 63,2-1440) vs 96,5 minutes (IQR 62,2-212), p = 0,019]. Procedural data and in-hospital outcomes were similar between the two groups, while the length of hospitalization was longer in patients of 2020 [6 days (IQR 5-8) vs 5 days (IQR 4-6), p = 0,003]. In this group was also observed a worse left ventricular ejection fraction at baseline and discharge (43% ± 9,5% vs 47,4% ± 9,7%, p = 0,011) (45,1% ± 9,2% vs 49,2% ± 9,6%, p = 0,013).

Conclusion: COVID-19 outbreak induced a reduction of hospital access for STEMI with an increase in treatment delay, longer hospitalization and worse left ventricular function both at baseline and discharge.

552 Acute COR pulmonale in a cohort of patients with COVID-19 related acute respiratory distress syndrome

Giulio Cacioli[1], Michele Ciabatti[2], Damiano Magrì[1], Antonella Romaniello[1], Maurizio Pieroni[2], Leonardo Bolognese[2], Massimo Volpe[1], and Camillo Autore[1]
[1]Divisione di Cardiologia, Dipartimento di Medicina Clinica e Molecolare, Facoltà di Medicina e Psicologia, La Sapienza, Roma, [2]Divisione di Cardiologia, Ospedale San Donato, Arezzo

Aims: COVID-19 is often characterized by severe hypoxemia, regardless of respiratory system compliance, high rate of pulmonary thromboembolism and diffuse thrombosis of pulmonary microcirculation at necropsy. Although these mechanisms can conspire to determine rapid onset of right ventricle (RV) overload and failure, the impact of acute cor pulmonale (ACP) in severe COVID-19 is still unclear.

Methods and results: Between March 27 and April 23, 2020 all patients hospitalized in our ICUs with COVID-19 related acute respiratory distress syndrome (ARDS) underwent systematic echocardiographic evaluations. The presence of RV overload and paradoxical movement of the interventricular septum defined ACP. At every time point of examination we collected all available clinical, laboratory and respiratory parameters and evaluated potential association with ACP. We enrolled 27 consecutive patients (59% males), mean age 69 ± 13 years. The first trans-thoracic echocardiogram was performed at a median time from ICU admission of 6 days. Mean ICU stay was 22 ± 16 days. Each patient underwent a mean of 2.4 ± 0.9 echocardiographic examinations. ACP was diagnosed in 7/27 (26%) at first echocardiographic evaluation. At univariate analysis, elevated plasma D-dimer (OR 1.41, 95% CI 1.02-1.94; p = 0.04) and troponin (OR 1.21, 95% CI 1.04-1.40; p = 0.01) on ICU admission presented significant association with ACP. During the 30 days Follow-up, 7/27 (26%) patients died, 4/7 (57%) with ACP and 3/20 (15%) without ACP. Mortality was significantly higher in patients with ACP than in the other patients (p = 0.048). During the follow-up, we did not observe any further ACP onset or worsening right ventricular function in non-ACP patients.

Conclusion: Transthoracic echocardiography may reveal ACP in a sizeable proportion of patients with COVID-19 related ARDS. In our cohort, ACP was associated with higher blood levels of D-dimer and troponin on ICU admission and with higher 30-days mortality as compared with ARDS patients without ACP.
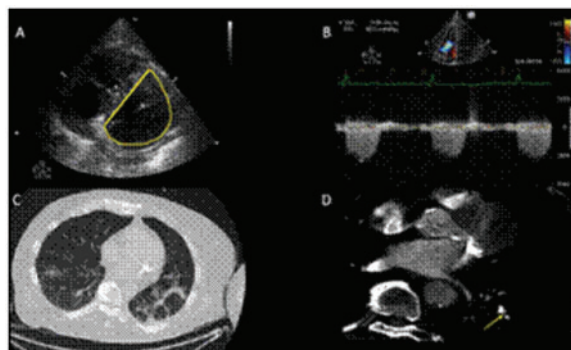
603 The negative impact of COVID-19 pandemic for non-COVID patients with acute coronary syndromes

Luigi Cappannoli[1,2], Daniele Rodolico[1], Stefano Migliaro[1,2], Filippo Crea[1,2], and Domenico D'Amario[1,2]
[1]Università Cattolica del Sacro Cuore, [2]Dipartimento di Scienze Cardiovascolari e Toraciche, Fondazione Policlinico Agostino Gemelli IRCCS

Aims: Coronavirus disease-2019 (COVID-19) affects cardiovascular patients in various way, both directly, because patients with previous cardiovascular disease face excess risks of severe illness and cardiovascular events, and indirectly, as demonstrated by the decline in the total number of hospitalizations, a decrease of primary percutaneous coronary intervention and a significantly longer median length of stay (LOS) in non-covid patients admitted during the pandemic. The aim of this study is to assess the impact of COVID-19 pandemic on the management and outcomes of patients presenting with STEMI during the period of the Italian lockdown.

Methods and results: We conducted a retrospective analysis on non-covid patients admitted in Policlinico A. Gemelli of Rome for STEMI during the Italian lock-down, from March 9th to May 3th 2020, making a comparison with the same period of 2019. We collected data about the delays between the onset of symptoms and the culprit lesion treatment (symptoms onset to first arrival to ED; ED arrival to first diagnosis by EKG; ED arrival to ED discharge; ED discharge to cath-lab arrival; cath-lab arrival to wire crossing; symptoms onset to wire crossing; arrival at PCI centre to wire crossing) and about the in-hospital outcomes (MACEs). We reported a mild decrease in the

number of hospitalization due to STE-ACS in 2020 (22) compared with 2019 (26) and a significant increase of in-hospital MACE in 2020 (27.3% vs 3.8%; p 0.038). No remarkable "patient delay" was observed in 2020 compared to 2019 (311 vs 216 minutes; p. 0,541), but a significant prolongation of the time from patient arrival at PCI centre to wire crossing (94 vs 196 minutes; p 0,038) was reported, due to the need to certainly assess the negativity to SARS-CoV2. Interestingly, we did not report differences between 2020 and 2019 in LOS (7,5 vs 9,5 days; p. 0,395).

Conclusion: Implementing STEMI chain of survival with adjunctive measures required by COVID-19 pandemic may negatively impact on the management of patients presenting with acute cardiovascular conditions. Prolongation of total ischaemic time in non-covid patients is not justified and should be avoided, as it does not provide clinical advantage and, conversely, worsen clinical in-hospital (and probably out-hospital) outcomes.

332 Unusual stroke during COVID-19 pandemic

Luca Felice Cerrito[1], Martina Milani[2], and Antonella Moreo[2]
[1]Section of Cardiology, Univerity of Verona, Verona, Italy, [2]Cardiovascular Department, Niguarda Great Metropolitan Hospital, Milan, Italy

During Coronavirus Disease 2019 (COVID-19) pandemic there was a dramatic drop of admissions of patients with acute coronary syndrome. There are plenty of theories circulating as to what could possibly drove STEMI rates down during this pandemic: patient's reclutance to go to a hospital during COVID-19 outbrake, lack of availability of local doctors and overload of emergency systems. A 54 years old male man was admitted to emergency department because of brain stroke-related symptoms. The patient's sister called the emergency number reporting the brother didn't answer the phone and he was at least a week that was suffering of stomach-ache. She also reported that the patient refused to go to hospital because was afraid about COVID-19. At health staff arrival the patients showed global aphasia and right hemisyndrome; head-neck CT scan revealed ischaemic areas in right frontal lobe and left parietal lobe. The patient was negative at COVID-19 test. ECG revealed anterolateral ST elevation with associated diffuse Q-waves and extreme QRS axis deviation. Transthoracic echocardiography showed lateral and inferolateral akinesia, severely depress left ventricular function, hematic pericardial effusion and a laceration of medium segment of lateral wall of the left ventricle. Coronary angiography revealed 70% stenosis of proximal, 80% of medium tract of left descending anterior coronary, 80% of proximal circumflex coronary, occlusion of I° obtuse marginal artery (culprit lesion) and dominant right coronary artery with no-significative stenosis. The patient, after heart team's discussion, underwent to urgent heart surgery. During surgery hematic pericardial clot was removed and a blood clot with a small bleeding area was found on infero-lateral wall of left ventricle; was also performed a single coronary artery by-pass on left anterior descending coronary. This case shows an important and rare complication of STEMI. Although cases on myocardial wall rupture are widely reported in literature, must be considered that in this case the patient refused to went to hospital due to COVID-19 outbrake. This case may help to consider that during COVID-19 pandemic infection, some patients died because they refused to go to the hospital or seek for medical help. Also this case may highlight the importance of telemedicine: if there was a telemedicine service, this patients we consider that this patients could have contacted the doctor by phone and be encouraged to go to the hospital earlier.

281 Admission QT interval and hydroxychloroquine treatment in SARS-CoV-2 patients

Cesare De Gregorio[1], Luca Zappia[1], Giulia Laterra[1], Giorgio Firetto[1], NunzioAntonio G. Fichera[1], Antonio G. Versace[2], and Francesco Luzza[1]
[1]Azienda Ospedaliera Universitaria di Messina, UOC di Cardiologia, [2]Azienda Ospedaliera Universitaria di Messina, UOC di Medicina Interna

Aims: During the SARS-CoV-2 outbreak, hydroxychloroquine (HCQ) has been suggested as an active antiviral agent, but iatrogenic effects were a warning for its large use in such patients. Early February, in the absence of international guidelines, we used HCQ for treating SARS-CoV-2 patients. The effects of this drug on QTc interval and incident arrhythmias were investigated between February and April 2020.

Methods and results: Among all patients admitted to hospital for confirmed SARS-CoV-2 disease HCQ treatment was established based on clinical needs and the absence of left bundle branch block, G6PD deficiency, congenital long QT, and basal QTc >550ms. HCQ was administered at a daily dose of 400-600 mg in selected patients, and ECG and clinical findings (heart rhythm, heart rate, QT and QT corrected, arrhythmic events) were measured on admission (T0), treatment course (T1) and at the end of drug administration (T2). A total of 76 patients, aged 69.3 ± 15.4 years, were studied. Interstitial pneumonia was found in 84% of cases. On admission, prolonged QTc was detected in 30 frail patients (39%) at T0, who entered the control group together with another 16 patients unsuitable for HCQ. Overall, 30 patients were eligible to receive HCQ for a maximum of 10 days. In some case

azithromycin was given in combination. QTc prolongation (>500ms in 4 cases) was seen in 50% of treated patients, but no serious arrhythmic events (except from premature ventricular beats) were encountered during and after the treatment.

Conclusion: In the present study population, the occurrence of QTc prolongation was observed in most frail patients admitted for SARS-CoV-2 infection before antiviral treatment. Fifty percent of HCQ recipients at a daily dose of 400-600 mg showed iatrogenic QTc prolongation, albeit no ventricular arrhythmias were observed. Though HCQ treatment has not been definitely demonstrated to be effective against SARS-CoV-2 infection, its use in our patient series was uneventful.

267 Cardiac point-of-care ultrasound in hospitalized COVID-19 patients: findings and association with outcome

Vincenzo De Marzo[1,2], Vered Gilad[1], Giulia Guglielmi[1,2], Roberta Della Bona[1], Stefano Giovinazzo[1,2], Fabio Pescetelli[1,2], Alberto Valbusa[1], Gian Paolo Bezante[1,2], Andrea De Maria[3,4], Nicoló Patroniti[5,6], Diego Ferone[7,8], Paolo Pelosi[5,6], Matteo Bassetti[3,4], and Italo Porto[1,2]
[1]Dicatov—Cardiothoracic and Vascular Department, San Martino Hospital, IRCCS for Oncology and Neurosciences, Genoa, Italy, [2]Department of Internal Medicine and Medical Specialties (Dimi), Clinic of Cardiovascular Diseases, University of Genoa, Genoa, Italy, [3]Infectious Diseases Unit San Martino Hospital, IRCCS for Oncology and Neurosciences, Genoa, Italy, [4]Department of Health Sciences (Dissal), University of Genoa, Genoa, Italy, [5]Anaesthesia and Intensive Care, San Martino Policlinico Hospital, IRCCS for Oncology and Neurosciences, Genoa, Italy, [6]Department of Surgical Sciences and Integrated Diagnostics, University of Genoa, Genoa, Italy, [7]Endocrinology Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy, [8]Endocrinology Unit, Department of Internal Medicine and Medical Specialties (Dimi) and Centre of Excellence for Biomedical Research (CEBR), University of Genoa, Genoa, Italy

Aims: Cardiovascular involvement has been reported in hospitalized COVID-19 patients. Primary outcome was to describe cardiac point-of-care ultrasound (POCUS) findings in a COVID-19 cohort patients. Secondary outcomes were to assess the association between echocardiographic findings and intensity of care expressed by respiratory distress (RD) grade, as well as the length of hospital stay and all-cause in-hospital mortality.

Methods and results: We performed a retrospective, observational cohort study, including all COVID-19 patients admitted to a tertiary Italian university hospital undergoing cardiac POCUS, and stratified according to the degree of RD at examination. Of 138 patients included in our study, 38 (27.5%) had mild RD, 35 (25.4%) had moderate RD, and 65 (47.1%) had severe RD. Most common abnormalities were left ventricular (LV) hypertrophy (38.4%), mild pericardial effusion (35.6%) and right ventricular (RV) dilatation (26.8%) (Figure 1). LV and RV systolic dysfunction were rare (13.0% and 5.1%, respectively). LV hypertrophy was more frequent in severe RD. No cardiac POCUS parameter was independently associated with in-hospital mortality, whereas RV dilatation was associated with longer hospital stay (Figure 2).

Conclusion: In COVID-19 patients, cardiac POCUS parameters independently associated with need for more intensive or longer care are LV hypertrophy and RV dilatation, respectively. LV and RV dysfunction are uncommon.
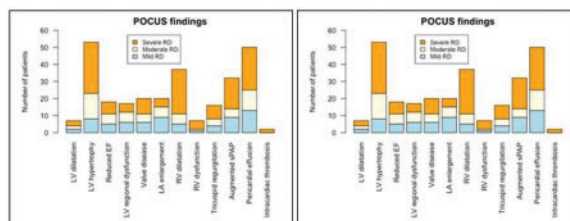
Figure 1 and 2.

268 Prevalence and prognostic value of an increase in cardiac troponin in elderly patients hospitalized for COVID-19

Vincenzo De Marzo[1,2], Antonio Di Biagio[3,4], Roberta Della Bona[1,2], Antonio Vena[3,4], Eleonora Arboscello[5], Harusha Emirjona[5], Sara Mora[6], Mauro Giacomini[6], Giorgio Da Rin[7], Paolo Pelosi[8,9], Matteo Bassetti[3,4], Pietro Ameri[1,2], and Italo Porto[1,2]
[1]Cardiovascular Diseases Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy, [2]Department of Internal Medicine, University of Genova, Genoa, Italy, [3]Infectious Diseases Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy, [4]Department of Health Sciences, University of Genova, Genoa, Italy, [5]Emergency Department, IRCCS Ospedale Policlinico San Martino, Genoa, Italy, [6]DIBRIS, University of Genova, Genoa, Italy, [7]Laboratory Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy,

[8]Anesthesia and Intensive Care Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy, [9]Department of Surgical Sciences and Integrated Diagnostics, University of Genova, Genoa, Italy

Aims: An increase in cardiac troponin (cTn) in coronavirus disease 2019 has been associated with worse prognosis. Nonetheless, data about the significance of cTn in elderly subjects with COVID-19 are lacking.

Methods and results: From a registry of consecutive patients with laboratory-confirmed COVID-19 admitted to a hub hospital in Italy from 26/02 to 03/07/2020, we selected those $\geq$60 year-old and with cTn I (cTnI) measured within 3 days from the molecular diagnosis of COVID-19. When available, a second cTnI value within 48 hours was also extracted. The relationship between increased cTnI and all-cause in-hospital mortality was evaluated by a Cox regression model and restricted cubic spline functions with three knots. Of 343 included patients (median age 75.0 (68.0-83.0) years, 34.7% men), 88 (25.7%) had cTnI above the upper-reference limit (0.046 μg/L). Compared with subjects with normal cTnI, they had more comorbidities, more impaired respiratory exchanges and higher inflammatory markers on admission. Furthermore, they died more often (73.9% vs. 37.3%, p < 0.001) over 15 (6-25) days of hospitalization (Figure 1). The association of elevated cTnI with mortality was confirmed by the adjusted Cox regression model (HR: 1.61, 95%CI: 1.06-2.52, p = 0.039) and was linear until 0.3 μg/L, with a subsequent plateau (Figure 2). Of 191 (55.7%) patients with a second cTnI measurement, 49 (25.7%) had an increasing trend, which was not associated with mortality (univariate HR 1.39, 95%CI 0.87-2.22, p = 0.265).

Conclusion: In elderly COVID-19 patients, an initial increase in cTn is common and predicts a higher risk of death. Serial cTn testing may not confer additional prognostic information.
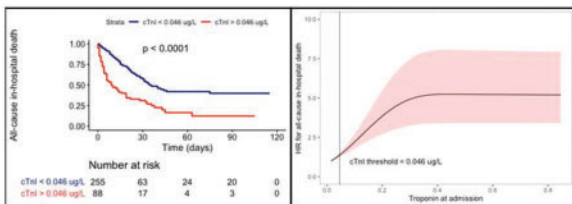
Figure 1 and 2.

448 Prospective cardiopulmonary stress testing evaluation of non-severe COVID-19 patients at three months after hospital discharge

Vincenzo De Marzo[2,3], Piero Clavario[1], Roberta Lotti[2,3], Cristina Barbara[1], Annalisa Porcile[1], Carmelo Russo[1], Luigi Bottaro[1], Marta Caltabellotta[1], Arto Hautala[4], Roberta Della Bona[2,3], Marco Canepa[2,3], Pietro Ameri[2,3], and Italo Porto[2,3]
[1]Cardiac Rehabilitation Center of Genoa, Azienda Sanitaria Locale (ASL) 3 Genoveseitaly, Genoa, [2]Dicatov—Cardiothoracic and Vascular Departmentirccs San Martino Hospital, Italy, Genoa, [3]Department of Internal Medicine and Medical Specialties (DIMI), University of Genoa, Italy, Genoa, [4]Cardiovascular Research Group, Division of Cardiology, Oulu University Hospital, University of Oulufinland

Aims: Coronavirus Disease of 2019 (COVID-19) pandemic accounts for several millions confirmed cases. Long-term effects of this infection and their sustainability in a huge number of patients are of the utmost relevance. We sought to determine pulmonary, cardiac, and functional capacity of non-severe COVID-19 survivors by cardiopulmonary exercise testing (CPET), and also those characteristics associated to worse performance at CPET.

Methods and results: In a prospective study we included the first 100 consecutive subjects undergoing post-COVID-19 evaluation at the Outpatient Cardiac Rehabilitation centre of Genoa, Italy. The local healthcare authority (Azienda Sanitaria Locale, ASL 3 Genovese) set up a structured follow-up program for all patients with a history of laboratory-confirmed COVID-19, admitted to ASL 3 COVID-19 wards from 1st of March 2020 to date (recruitment is still ongoing). As we focused on non-critical cases, we excluded those who needed invasive ventilation during hospital stay. We also excluded those patients with lack of data on hospital stay and those unable to perform CPET. At 3 months from COVID-19 diagnosis, all patients received complete clinical evaluation, trans-thoracic echocardiography, maximal CPET, pulmonary function test (PFT), and dominant leg extension (DLE) maximal strength evaluation. After exclusion of severe cases and incomplete/missing data, 75 patients were included in the final analysis. Median age was 58.8 (52.0-68.8) years, 28 (37.3%) were female. Median percent predicted oxygen uptake (%VO2) was 90.7 (78.9-109.0)%. Twenty-seven (36.0%) patients had %VO2 below, whereas 48 (64.0%) above the 85% predicted value (indicating normality). At PFT, median FEV1, FVC, and DLCO were all within normal limits. Seven patients (25.9%) had a mainly respiratory, 3 (11.1%) a mainly cardiac, 1 (3.7%) a mixed cardiopulmonary, and 16 (59.3%) a non-cardiopulmonary limitation of exercise. At multivariate linear regression analysis,

only DLE maximal strength (β = 1.90, p = 0.037) and active smoke (β = -7.02, p = 0.041) were independently associated with %VO2.

Conclusion: More than 1/3rd of non-severe COVID-19 survivors show exercise capacity limitation at CPET that could be mainly explained by muscular impairment, albeit cardiopulmonary causes are possible. These findings lay the foundation for future research to identify patients at higher risk of long-term effects which may benefit from careful surveillance and targeted rehabilitation programs.
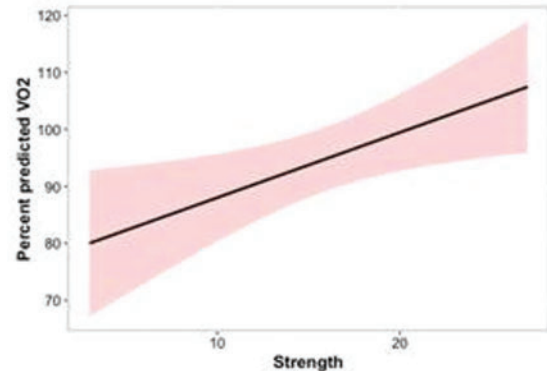
215 Electrocardiographic findings at presentation and clinical outcome in patients with SARS-CoV-2 infection

Gaetano Antonio Lanza[1], Antonio De Vita[1], Salvatore Emanuele Ravenna[1], Alessia DAiello[1], Marcello Covino[2], Francesco Franceschi[2], and Filippo Crea[1]
[1]Dipartimento di Scienze Cardiovascolariuniversita' Cattolica del Sacro Cuore (Roma), [2]Fondazione Policlinico Universitario" A Gemelli" Irccs—Dipartimento di Scienze Dell'emergenza, Anestesiologiche e Della Rianimazione

Aims: The main severe complications of SARS-CoV-2 infection are pneumonia and distress respiratory syndrome. Recent studies, however, reported that cardiac injury, as assessed by troponin levels, is associated with a worse outcome in these patients. No study hitherto assessed whether the simple standard electrocardiogram (ECG) may be helpful for risk stratification in these patients.

Methods and results: We studied 324 consecutive patients admitted to our Emergency Department with a confirmed diagnosis of SARS-CoV-2 infection. Standard 12-lead ECG recorded on admission was assessed for cardiac rhythm and rate, atrioventricular and intra-ventricular conduction, abnormal Q/QS wave, ST segment and T wave changes, corrected QT interval and tachyarrhythmias. At a mean follow-up of 31 ± 11 days, 44 deaths occurred (13.6%). Most ECG variables were significantly associated with mortality, including atrial fibrillation (p = 0.002), increasing heart rate (p = 0.002), presence of LBBB (p < 0.001), QRS duration (p < 0.001), a QRS duration $\geq$ 110 ms (p < 0.001), ST segment depression (p < 0.001), abnormal Q/QS wave (p = 0.034), PVCs (p = 0.051) and presence of any ECG abnormality (HR 4.58; 95% CI 2.40-8.76; p < 0.001). At multivariable analysis, QRS duration (p = 0.002), QRS duration $\geq$ 110 ms (p = 0.03), LBBB (p = 0.014) and presence of any ECG abnormality (p = 0.04) maintained a significant independent association with mortality.

Conclusion: Our data show that standard ECG can be helpful for an initial risk stratification of patients admitted for SARS-CoV-2 infectious disease.

216 Comparison of electrocardiographic findings and clinical outcome in patients with COVID-19 or other respiratory infectious disease

Antonio De Vita[1], Salvatore Emanuele Ravenna[1], Marcello Covino[2], Francesco Franceschi[2], Filippo Crea[1], and Gaetano Antonio Lanza[1]
[1]Dipartimento di Scienze Cardiovascolariuniversita' Cattolca del Sacro Cuore (Roma), [2]Fondazione Policlinico Universitario" A Gemelli" Irccs—Dipartimento di Scienze Dell'emergenza, Anestesiologiche e Della Rianimazione

Aims: The coronavirus SARS-CoV-2 is causing a pandemic outbreak of severe respiratory disease. Some studies showed that coronavirus disease (COVID-19) is associated with myocardial injury in 20-25% of hospitalized patients. However, whether the prevalence of cardiac involvement is increased in these patients compared to other infectious respiratory diseases is unknown.

Methods and results: We studied 556 consecutive patients admitted to our Emergency Department with an acute respiratory infectious disease, 324 of whom were diagnosed to have SARS-CoV-2 infection (COVID-19 group) and 232 other kinds of infectious respiratory disease (no-COVID-19 group). Standard 12-lead electrocardiogram (ECG) recorded on admission was assessed for cardiac rhythm, atrio-

ventricular and intra-ventricular conduction, abnormal Q/QS wave, ST segment and T wave changes, corrected QT (cQT) interval and tachyarrhythmias. Overall, any ECG abnormality was found in 120 COVID-19 patients (37%) and 101 (43.5%) no-COVID-19 patients (p = 0.13). Atrial fibrillation was present in 6.2% and 12.1% of patients in COVID-19 and no-COVID-19 group respectively (p = 0.021). QRS duration was similar in the 2 groups (p = 0.62), but there was a higher prevalence of left bundle branch blocks in no-COVID-19 group (1.9% vs. 6%, p = 0.011). The prevalence of premature supraventricular complexes was lower among COVID-19 patients (p = 0.029), whereas the prevalence of premature ventricular complexes (p = 0.42), prolonged cQT interval (p = 0.43), ST-segment depression ≥0.5 mm (p = 0.68) or ≥1 mm (p = 0.13) and T wave inversion (p = 1.00) did not differ between the 2 groups. However, no differences in ECG variables were found between the 2 groups in a comparison of propensity score matched subgroups of 336 patients (168 in each group).During a follow-up of 45 ± 16 days, 51 deaths (15.7%) occurred in the COVID-19 group and 30 (12.9%) in the no-COVID-19 group. QRS duration (p = 0.016), ST segment depression ≥0.5 mm (p = 0.016) and the presence of any ECG abnormality (p = 0.027) maintained a significant association with mortality at multivariable analysis. In the propensity score matched cohort, mortality was significantly higher in COVID-19 patients (23.2% vs. 13.7%; HR 1.76; p = 0.032).

Conclusion: Our data show that standard ECG does not show significant different rates of abnormal findings in patients with COVID-19 compared to those with other kinds of acute infectious respiratory disease. Among patients with an acute respiratory illness an abnormal ECG and, in particular, the presence of ST-segment depression on admission identify a population at increased risk of in-hospital death.

58   Pulmonary embolism as first manifestation in non-severe COVID-19

Daniela Aschieri[1], Mariateresa Di Dio[1], Paola Novara[1], and Gianluca Lanati[1]
[1]U.O Cardiologia, Ospedale Unico Della val Tidone Ausl Piacenza

Aims: a typical clinical manifestation of COVID-19 is pneumonia. Fever is the most common presentation, followed by cough and dyspnoea. Patients could also present tachycardia, hemogasanalysis alterations and increased D-dimer levels. Recent studies have reported that COVID-19 is often accompanied by coagulopathy, and a significant number of patients with severe or critical COVID-19 develop concomitant thrombosis, including pulmonary embolism (PE).

Here, we report a case of pulmonary embolism as first clinical presentation of non-severe COVID-19 in a woman without any risk of thrombosis.

Methods and results: 49-year-old female, in treatment with low dose beta-blockers for mild hypertension, was admitted to the Emergency Department for an atypical, dorsal, stinging chest pain, without fever neither cough nor dyspnoea. She had no risk factors for venous thromboembolism.

An ECG showed sinus tachycardia with non-specific repolarization abnormalities. Laboratory data showed no lymphopenia, normal kidney and liver function, normal serum electrolytes, negative troponin, minimal elevation of CRP and a significant increase of D-dimer levels (3484 nanogr/ml FEU). A contrast chest computed tomography scan was performed and revealed endoluminal filling defects affecting the bilateral lower lobar branches of the pulmonary artery. Moreover, ground glass areas were described in the basal back of the lungs due to interstitial inflammation. Oropharyngeal swab was performed and tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV2). Therapeutic dosage of low molecular weight heparin (LMWH) was administered and, at the same time, antiviral therapy with darunavir/cobicistat and hydroxychloroquine have been started.

A Doppler examination of the lower limbs revealed no thrombi in the deep venous circle. Doppler echocardiography showed no signs of increased right ventricular pressure.

Screening tests for autoimmune disease and congenital coagulation abnormalities, such as activated protein C, activated protein S, anti-double stranded DNA, antinuclear antibody, anti-cardiolipin-β2-glycoprotein I complex antibody, and lupus anticoagulant were all negative. On day 7 post-admission, we replaced heparin with apixaban. D-dimer levels gradually decreased.

During the hospitalization, the patient was treated with low flow oxygen, without need for non-invasive ventilation.

Conclusion: As demonstrated by this clinical case, pulmonary embolism can occur as first manifestation of SARS-CoV2 infection, also in patients with non-severe disease. For this reason, we believe that therapeutic doses of LMWH could be administered and possibly play a favorable role in preventing thrombotic complications. Hence, LMWH should be tested in randomized clinical trials in patients with COVID-19.

146   Out-of-hospital-cardiac-arrest in COVID-19 era

Daniela Aschieri[1], Mariateresa Di Dio[1], Gianluca Lanati[1], Paola Novara[1], Valentina Pelizzoni[2], Donatella Covini[1], and Lucia Torretta[1]
[1]U.O. Cardiologia Ospedale Valtidone Ausl Piacenza, [2]Ospedale" G. Da Saliceto" Piacenza

Aims: the coronavirus disease 2019 (COVID-19) pandemic has affected health and economy worldwide. Adverse cardiovascular sequelae, such as myocarditis, acute

myocardial infarction, heart failure and pulmonary embolism have been reported in patients with COVID-19, but it is unclear whether there is an association between Covid-19 and out-of-hospital cardiac arrest.

Piacenza is a border town between Emilia Romagna and Lombardy, located near to the epicenter of the COVID-19 pandemic. Hence, it was the city most affected by COVID19 in Emilia Romagna. the aim of the study was to compare the occurrence of out-of-hospital-cardiac-arrest (OHCA) during COVID-19 pandemic with that of pre-COVID era.

Methods and results: using the Progetto Vita Registry, we compared OHCA that occurred in Piacenza province during the first three months of Covid-19 outbreak (from February to April 2020) with those that occurred during the same period in 2019 (from February to April 2019). We collected data from the electronic database of the emergency medical system to identify patients affected by COVID-19, including both patients with symptoms suggestive of Sars-CoV-2 infection (history of fever before out-of-hospital cardiac arrest, with cough, dyspnoea, or both) and patients with positive results of pharyngeal swabs test to detect SARS-CoV-2 obtained before the event or after death. from February to April 2020, 156 cases of OHCA were identified, as compared to 78 cases of the same period in 2019. Among patients with OHCA, we reported 68 cases of COVID-19. The 44,9% (n : 70) of the population were women. Overall median age was 79,2 years (female: 83,5 years; male: 75,6 years). Demographic characteristics of patients were similar in 2020 and 2019.

The median arrival time was 5,3 min longer in 2020 compared with 2019; the incidence of out-of-hospital death was 6,4% higher in 2020 than in 2019 and no one received cardiopulmonary resuscitation from bystanders in 2020. Initial cardiac rhythm was shockable in 6,4% (n : 10) of patients in 2020 compared with 15,4% (n : 12) in the same period of 2019.

Conclusion: during Covid-19 pandemic in Piacenza there was an increase in OCHA compared to the pre-COVID era. A total of 68 patients who experienced OCHA were suspected to have or had a diagnosis of Covid-19; these numbers account for 87.2% of the increase in cases of out-of-hospital cardiac arrest observed in Piacenza in 2020. This may be mainly due to an increased number of acute thromboembolic events occurred during COVID pandemic. Anticoagulant therapy should be considered in COVID-19 patients and the evaluation of D-Dimer could guide patient selection for this therapy.

148   Hospital mortality and safety of therapeutic vs. prophylactic doses of low molecular weight heparin in COVID-19 patients

Daniela Aschieri[1], Marco Stabile[2], Cristina Maestri[3], Luca Rosato[2], Paola Novara[1], Gianluca Lanati[1], Mariateresa Di Dio[1], Cosimo Franco[4], Giuseppina Bisceglie[6], Giuseppe Leddi[5], Enrico Fabrizi[7], Paola Rucci[9], and Gloria Tagliani[8]
[1]Cardiology Unit, Emergency Departmentcastel San Giovanni Hospital, Ausl Piacenza, [2]Plastic Surgery Unitcastel San Giovanni Hospital, Ausl Piacenza, [3]Emergency Care Unitcastel San Giovanni Hospital, Ausl Piacenza, [4]Respiratory Intensivecastel San Giovanni Hospital Ausl Piacenza, Care Unit, [5]Orthopedic Unitcastel San Giovanni Hospital, Ausl Piacenza, [6]General Medicine Unitcastel San Giovanni Hospital, Ausl Piacenza, [7]Dises And DSS, Università Cattolica del S. Cuore, Piacenza, [8]Department of Translational and Precision Medicinesapienza University, Rome, [9]Department of Biomedical and Neuromotor Scalma Mater Studiorum University, Ience, Bologna

Aims: To compare the hospital mortality of COVID-19 patients treated with low molecular weight heparin, administered at prophylactic dose (P-LMWH) or at therapeutic dose (T-LMWH).

Design: Retrospective cohort study

Setting: Patients with COVID-19 pneumonia consecutively admitted to Castel San Giovanni COVID-Hospital from February 29, to April 7, 2020.

Main outcome measure: Hospital mortality.

Methods and results: Of the 257 patients enrolled, 49 (19.1%) died during the hospitalization. Hospital mortality was significantly lower in patients treated with T-LMWH (17/126, 13.5%), compared with patients treated with P-LMWH (32/131, 24.4%; χ^2=4.98, p = 0.02). Crude and adjusted odds ratios of mortality for patients treated with T-LMWH were OR = 0.483, 95% CI 0.252-0.923 and OR = 0.374, 95% CI 0.177-0.792). In a stratified analysis by ventilation type, the only subgroup of patients who benefited from therapeutic doses of heparin were those receiving non-invasive mechanical ventilation (OR = 0.099, 95% CI 0.028-0.354, p < 0.001). No fatal bleedings were observed.

Conclusion: Treatment with therapeutic doses of LMWH is safe and reduces mortality in COVID-19 patients with severe pneumonia, especially among those who need non-invasive mechanical ventilation.

150   Effectiveness of helmet CPAP to reduce intubation and mortality rate in patients with COVID-19

Francesco Andrani[1], Angelo Mangia[1], Enrica Bucchioni[1], Sara Chiesa[1], Paolo Magri[1], Antonella Ielpo[1], Silvia Di Stasi[1], Carlo Cagnoni[5], Daniela Aschieri[2], Marco Stabile[3], Cristina Maestri[4], Mariateresa Di Dio[2], and Cosimo Franco[1]
[1]Respiratory Intensive Care Unitospedale" G. Da Saliceto" Piacenza, [2]Cardiology Ospedale Castel San Giovanni Ausl Piacenza, Unit, [3]Plastic Surgery Unitospedale

Castel San Giovanni Ausl Piacenza, [4]Emergency Unitospedale Castel San Giovanni Ausl Piacenza, [5]Medical Ward Unit,Ospedale Castel San Giovanni Ausl Piacenza

Aims: Effective respiratory support is crucial in the management of COVID-19. The objective of this study was to evaluate the effectiveness of helmet continuous positive airway pressure (CPAP) in reducing mortality and delaying mechanical ventilation.

Methods and results: Demographic and clinical records from patients admitted to Castel San Giovanni Hospital (Piacenza, Italy), with a confirmed COVID-19 diagnosis, between the 15th and 30th of March 2020, were analyzed. A total of 200 patients were included in the analysis, 78% were male, median age was 68.5 years, and 121 (69%) had at least 1 comorbidity. Of the 200 patients, 110 (55%) used only oxygen; 90 (45%) underwent CPAP treatment, 16 of whom (18.6%) were not compliant to CPAP (non- compliant group). In the subgroup compliant with CPAP, the need for intubation was slightly lower compared to the non-compliant group (33.3% vs 37.5%).

A total of 32 (16.1%) patients died overall. The lowest mortality was in the CPAP-compliant group (8.3%) as compared to the non-compliant and no CPAP groups (68.8% and 13.4%, respectively). Mortality was higher in smokers (30%) and in obese patients (19.2%). The number of previous comorbidities had an impact on the mortality rate, especially for COPD, hypertension and malignancy.

Conclusion: This retrospective study indicated the effectiveness of helmet CPAP, in hospitalized patients with ARDS secondary to COVID-19, in reducing both mortality and the need for endotracheal intubation.

329 Impact of COVID-19 outbreak on workload and case-mix in a dedicated CMR laboratory

Alessandra Scatteia[2], Carlo Di Nardo[1], Raffaella America[2], Carmine Emanuele Pascale[2], Giuseppe Russo[2], Pasquale Guarini[2], Giovanni Esposito[1], and Santo Dellegrottaglie[2]
[1]Universita' Degli Studi di Napoli Federico II, [2]Casa di Cura Villa dei Fiori Acerra

Aims: Cardiac magnetic resonance (CMR) is an extremely valuable imaging tool for diagnosis and monitoring of multiple cardiac conditions. During the spring of 2020, the rapid spreading of COVID-19 outbreak in Italy required political and societal responses that significantly affected social life, economy, and healthcare. During the worse phase of the outbreak, the entire national health service has been reshaped in order to manage the incident cases and be prepared to the new potential cases of COVID-19. CMR laboratories throughout the Country either completely stopped their clinical activity, with staff reassigned to other hospital activities, or performed only urgent scans, meaning those possibly impacting on the correct management of serious clinical entities. Aim of this study was to describe the characteristics of scanning activity performed during the period of national lockdown in a dedicated CMR laboratory.

Methods and results: From the general log-book of the CMR laboratory at Clinica Villa dei Fiori Acerra (Naples), operating in an Italian region only mildly involved by the outbreak, data about scanning activity as performed during the lockdown period (March-May 2020) were collected and compared with the level and type of activity in 2019 as a reference. We focused on the total number of exams performed, frequencies of clinical indications as well as modality of patient referral (inpatient vs outpatient). In 2019, the CMR laboratory performed a total of 889 exams, with the majority of them in an outpatient setting (75%) (**Figure 1 A**). The most common clinical indications were cardiomyopathies (37%) and ischaemic heart disease (27%, when including both acute and chronic presentation), followed by congenital heart diseases (13%) (**Figure 1 B**). The relative prevalence of each clinical indication remains substantially unchanged when only the March-May 2019 period was considered. In the corresponding time period of 2019 (March-May), a significant reduction in the total number of performed scans was observed ($\Delta=$ -47%). During the lockdown period in 2020, the inpatients accounted for 71% of all the CMR exams (**Figure 2 A**), with the main clinical indications being acute cardiac conditions (44%, when including acute coronary syndrome, myocardial infarction with no coronary obstruction and myocarditis) and advanced heart failure from known or suspected cardiomyopathy (29%) (**Figure 2 B**).

Conclusion: During the most acute phases of COVID-19 outbreak in Italy, CMR scanning activity was significantly impacted both in quantitative and qualitative terms. In agreement with specific SCMR scientific recommendations, mostly urgent and acute clinical conditions led to the execution of a CMR exam during those months. More studies are needed to fully assess the short-term and long-term impact of this pandemic on the patterns of use of advanced cardiovascular imaging and consequences on clinical management of cardiac patients.
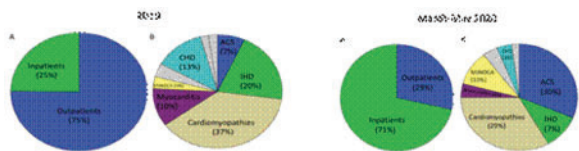
Figure 1 and 2.

188 COVID-19-related arrhytmic storm as early manifestation of the infection: a case report

Filippo Dossi[1], Paolo Franca[1], Chiara De Toni[1], Alessandro Marini[1], Giuseppe Sanna[1], Guido Parodi[1], and Pier Sergio Saba[1]
[1]Cardiologia Clinica ed Interventistica—Azienda Ospedaliera Universitaria di Sassari

Aims: Cardiovascular manifestations of COVID-19 are mainly related to thrombotic complications induced by the viral infection. However, some epidemiological report suggests a role of COVID-19-related electrical instability as a contributor to the disease's mortality. This electrical vulnerability could be even more evident in patients with previous coronary artery disease, as occurred in the case here reported.

Methods and results: A 63-year-old man was admitted in March 2020 in our hospital for chest pain and ECG manifestation of extensive anterior STEMI and hemodynamic instability. His past medical history was remarkable for arterial hypertension, type-1 diabetes mellitus and dyslipidemia. Immediate coronary angiography was performed, that showed diffuse coronary artery disease of the right coronary artery (*chronic total occlusion*), the left main trunk, and the origin of anterior descending (LAD) and circumflex arteries. The proximal circumflex artery and obtuse marginal branch were also involved. An emergency percutaneous coronary intervention was performed. After staged PTCI and multiple implantations of drug-eluting stents complete coronary revascularization was achieved. Transthoracic echocardiography, that in the acute phase showed extensive wall motion abnormalities with severe left ventricular systolic dysfunction (EF$=$30%), after revascularization gradually improved (EF$=$40%). In the following days, the clinical conditions were stable. A routine chest X-ray indicated no pleural effusion or pulmonary congestion. Arterial Blood Gas (ABG), without oxygen support, showed no impairment in gas exchanges; blood tests were also normal apart for blood glucose levels which remained unstable and substantially elevated despite appropriate insulin therapy. During the night of the day 10[th,] after admission, the patient reported dry cough and fever (37.5° C). No remarkable symptoms were reported in the day after. However, in the morning of the 12th day, the patient suddenly presented with a witnessed cardiac arrest. Cardiopulmonary resuscitation was promptly initiated and ventricular fibrillation (VF) was rapidly identified and treated with 200 Joules DC shock. However, cardiac rhythm rapidly degenerated to new repeated episodes of VF despite appropriate Advanced Cardiovascular Life Support protocol was promptly initiated. ABG showed no electrolytes imbalance. To rule out potential acute-stent-thrombosis as a cause of recurrent VF, an emergency coronary angiography was performed showing the patency of the implanted stents and a TIMI flow grade 3 in all the main coronary branches. The patient was in the same day tested positive for Sars-CoV-2 infection. In the next day, interstitial pneumonia appeared at a chest high-resolution computed tomography. In the following days the patient developed multi-organ failure and after recurrent episodes of VF refractory to therapy eventually died 18 days after initial admission.

Conclusion: This case confirms that electrical instability might severely complicate COVID-19 in the very early phases of the disease. The concomitant presence of previous cardiovascular disease might act as a facilitator for the occurrence of an arrhythmic storm. In the context of COVID-19 pandemic, if the infection is suspected or proved, we suggest that a 24/h ECG monitoring should be considered in patients with established cardiovascular diseases.

522 Acute myocardial infarction in asymptomatic patient in subacute phase of SARS-CoV-2 disease: a case report

Ilaria Ferrari[1], Ilaria Cardillo[1], Vania Chianta[1], Flavio Giuseppe Biccirè[1], Michele Schiariti[1], Concetta Torromeo[1], Gaetano Tanzilli[1], Carlo Gaudio[1], and Francesco Barillà[1]
[1]Department of Cardiovascular, Respiratory, Nephrologic, Anesthesiologic and Geriatric Sciences—Sapienza, University of Rome, Italy—Umberto I Hospitalrome

Aims: The clinical manifestations of Sars-Cov-2 infection are mostly dominated by respiratory tract symptoms, but the cardiovascular complications increase risk of morbidity and mortality in these patients. Sars-Cov2-related cardiac involvement is mostly described in patients with cardiovascular risk factors and in the acute phase of viral disease.

Methods and results: A 43-year-old man, who had Sars-Cov2 viral syndrome two months before, without cardiovascular risk factors, was admitted to our emergency department for acute chest pain and shortness of breath. At admission, he still tested positive for Covid-19, despite complete regression of typical Sars-Cov2 viral syndrome 30 days before. His hemodynamic parameters showed a regular heart rate of 85 beats/minute and blood pressure of 110/80 mmHg. The electrocardiogram showed an anterior ST-elevation myocardial infarction (STEMI). The patient was immediately addressed to cathlab for primary percutaneous coronary intervention (pPCI). The invasive coronary angiogram revealed a proximal occlusion of left descending coronary artery, with other coronary vessels free of atherosclerotic disease. After recanalization of the culprit vessel, an elevated thrombotic burden was found requiring aspiration of the thrombus, successfully performed. Then, a biolimus eluting stenting (3.00x24mm) was implanted with a TIMI 2 flow recorded after the procedure. An echocardiogram revealed a mildly depressed left ventricular systolic

function with an ejection fraction of 45% with hypokinesia of apex and mid-distal anterior wall. In-hospital permanence was free of any complication and the patient was eventually discharged after 7 days, with negative naso/oropharyngeal swab for Sars-Cov2.

Conclusion: Acute Coronary Syndrome is a possible late complication of paucisymptomatic Sars-Cov2 disease. Immediate diagnosis of myocardial infarction is crucial in suspected COVID-19 patients, even in patients without classic cardiovascular risk factors. Monitoring these patients in the late asymptomatic phase of the infection may be useful to detect early sign or symptoms of any cardiovascular complications. A longer-term antithrombotic treatment also in patient without critical symptoms of COVID-19 may be suggested to prevent thrombotic complications.

557　Atrial fibrillation in COVID-19: an association with in-hospital mortality

Carlo Fumagalli[1], Tommaso Bencini[1], Rossella Marcucci[1], Federico Lavorini[1], Iacopo Olivotto[1], Andrea Ungar[1], Niccolò Marchionni[1], and Stefano Fumagalli[1]
[1]Dipartimento di Medicina Sperimentale e Clinica, Università Degli Studi di Firenze e Aou Careggiitalia, Firenze

Aims: Pneumonia caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection and its' related disease (COVID-19) emerged in Wuhan City, Hubei Province, China in December 2019. Among the most vulnerable and frail, those with a history of coronary artery disease (CAD), hypertension, heart failure, history of stroke/TIA. In this study we focused specifically on those presenting with atrial fibrillation (AF) as primary comorbidity, since AF and COVID-19 share some critical risk factors.

Methods and results: We prospectively collected data from patients admitted to Careggi University Hospital, Florence, from March 3rd to July 18th with COVID-19 diagnosis. Variables assessed on hospital admission included: demographics, number of drugs prescribed, cardiovascular (CV) risk factors. Arterial blood gases, laboratory findings and chest-x-ray were collected as well. AF was defined according to current guidelines. Aim of the study was to compare patients' characteristics by presence or absence of AF, to assess the association of AF with survival status (mortality vs. discharge from hospital) and determine its predictors. Of 318 enrolled patients, 62 (19.5%) had a history of AF both before and during hospital stay. We observed that patients in the AF group were older (78 ± 11 vs. 65 ± 15 years, $p < 0.001$), were prescribed with more drugs (6.6 ± 3.6 vs. 3.1 ± 3.1, $p < 0.001$), had more comorbidities (5.1 ± 2.1 vs. 2.6 ± 2.1, $p < 0.001$). In addition, patients with an history of AF, shown higher CV-risk profile, with significant higher prevalence of hypertension (74.2% vs. 50.4%, $p < 0.001$), CAD (45.2% vs. 17.4%, $p < 0.001$), heart failure (46.8% vs. 16.4%, $p < 0.001$) and history of stroke/TIA (22.6% vs. 8.2%, $p < 0.001$). Patients with AF presented with a cancer history more frequently and had a higher prevalence of cognitive decline (36.1% vs.15.7%, $p < 0.001$).

Among laboratory findings, patients with AF had lower levels of lymphocytes, higher creatinine levels (1.5 vs 1.1 mg/dL, $p < 0.001$), LDH (430.3 vs. 325.8 U/L, $p < 0.001$), C-Reactive Protein (CRP, 113.4 vs 83 mg/L) and aPTT.

The most important differences between the two populations were reported in the destination at discharge and in-hospital mortality.

Mortality rate was higher in AF patients (36.1 vs 14.1%, $p < 0.001$). AF patients were discharged towards a rehabilitation facility more frequently (16.4 vs 11.3%, $p < 0.05$).

Baseline independent predictors of AF were age (OR : 1.04 95% CI 1.01-1.08, $p = 0.008$), number of comorbidities (OR : 1.41 95% CI 1.21-1.64, $p = 0.001$), CRP (OR : 1.01 95% CI 1.01-1.02, $p = 0.035$) and aPTT (OR : 1.11 95% CI 1.04-1.18, $p = 0.002$)

Conclusion: AF is common in COVID-19 patients and is associated with worse outcome. Given the similar risk factors between AF and COVID-19, AF should be regarded as a synergistic and precipitating factor which should warrant prompt and specific care.

322　Giant right ventricular thrombus and COVID-19: a bad luck case?

Ailia Giubertoni[1], Alessia Veia[1], Luigi Mario Castello[1], Simona De Vecchi[1], Matteo Santagostino[1], Tiziana Cena[1], Marco Mennuni[1], Giovanni Casali[1], and Giuseppe Patti[1]
[1]AOU Maggiore Della Carita'—Novara

We describe a case of a 49-year-old woman hospitalized for COVID-19-related bilateral interstitial pneumonia with severe adult respiratory distress syndrome.

Chest CT scan performed in emergency department showed a large mass in the right ventricle, bilateral peripheral pulmonary embolism and extensive ground-glass opacifications involving both lungs (Fig. 1). The patient was admitted to our sub-intensive care unit and treatment with lopinavir/ritonavir, hydroxychloroquine and continuous positive airway pressure was immediately started.

Trans-thoracic echocardiography confirmed a floating mass in the right ventricle, which diameters were about 27 x 12 mm (Fig. 2). RV size and function were normal and systolic pulmonary arterial pressure was 60 mmHg.

Surgery was contraindicated because of pneumonia and unfractionated heparin infusion was started.

The following day we performed a cardiac magnetic resonance that confirmed the presence of a mass consistent with thrombosis.

Since the patient was hemodynamically stable but became intolerant to the continuous intravenous infusion, we switched UH to dabigatran 150 mg bid.

Echocardiography performed at 15 days (4 days after starting dabigatran) showed complete thrombus resolution.

Ex adiuvantibus diagnosis of RV thrombosis was performed after thrombus resolution. In conclusion, although thrombotic complications have been reported in COVID-19 patients, this case represents the first report of intracardiac COVID-19-related thrombosis.

After 4 weeks of hospitalization, the patient was discharged at home in good general condition; no oxygen supplementation was needed and a 6-month treatment with dabigatran was prescribed.
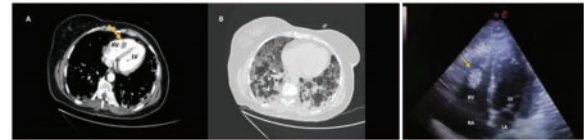
Figura 1 and 2.

251　A rare and silent case of disseminated intravascular coagulation in COVID-19 severe pneumonia

Valeria Gritti[1], Simona Pierini[1], Anita Paggi[1], Rossella Luciano[1], Margherita Pirondini[1], and Maurizio Ornaghi[1]
[1]Ospedale Bassini

A 67yo man admitted for COVID-19 bilateral pneumonia rapidly evolved in ARDS requiring CPAP support. He received antiretroviral therapy, hydroxychloroquine, dexamethasone, two tocilizumab doses in addition to LMWH 75UI/Kg/die. On 10th day D-Dimer raised (105000 µgr/l, ULN 500), right axillary venous thrombosis was detected, no right ventricle impairment was observed at echocardiography; dose of LMWH was doubled. Respiratory conditions were then getting better and CPAP support stopped. On 20th day of hospitalization patient presented acute lower abdominal pain with hypotension and sudden 3 gr/dl hemoglobin loss. CT scan showed a voluminous psoas hematoma with active bleeding and bilateral pulmonary embolism (figure below). He underwent trans-catheter embolization of three lumbar arteries with angiographic success, no further blood loss site identified. Few hours later he evolved into multi organ failure shock. Laboratory testing shown hemoglobin loss despite ongoing blood transfusion, normal platelet count, D-dimer 6500 µgr/l with a trend toward reduction, mild fibrinogen reduction (115 mg/dl), mild INR raise (1,9 from a range 1,2-1,7) and reduction in anti-thrombin (AT) III activity (45%), confirming disseminated intravascular coagulation diagnosis. Hemorrhagic shock support therapy was provided, including fresh frozen plasma and blood transfusions but patient died two days later.
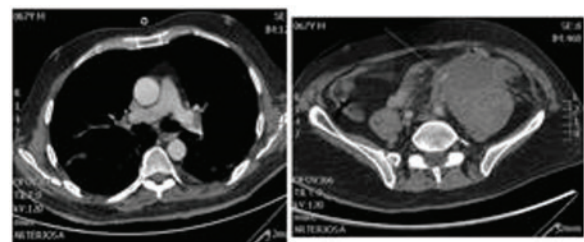
CT scan images left: pulmonary bilateral embolism. Right: psoas haematoma.

In novel COVID-19 infection, coagulation disorder set off by inflammation are frequent and abnormal coagulation parameters are associated with poor prognosis. In these patients, DIC incidence seems to be 71,4% among deaths; haemorrhagic events are considered rare. To properly detect coagulopathy during sepsis the International Society of Thrombosis and Hemostasis (ISTH) guidelines recommends Sepsis-Induced-Coagulopathy (SIC) score considering: PT/INR, platelets count and presence of organ failure. In recent interim guidelines targeted to recognition and treatment of coagulopathy in COVID-19 patients, ISTH recommend to dose and monitoring: D-Dimer, PT, fibrinogen and platelet count, despite these last are often normal. SIC score performed during hospital stay for our patients was not significant (2 points: INR and respiratory impairment), daily measurements of platelets were not alarming, INR was slight constantly altered as often seen in COVID-19 severe infection and D-Dimer was in reduction after doubling LWWH dose for axillary thrombus. Despite these findings we observed a rare DIC with both thrombotic and hemorrhagic important manifestation, thus giving less diagnostic significance to proposed scores in COVID-19 patients.

Major clinical manifestations then occurred, not responsive to conventional treatment.

545 CE-I and ARBS do not influence the clinical and chest CT presentation of patients with COVID-19 at the onset of disease: Italian multicenter registry

Massimo Mancone[1], Fabio Infusino[1], Sara Cimino[1], Lucia Ilaria Birtolo[1], Fabrizio D'Ascenzo[2], Mariachiara Colaiacomo[1], Chiara Andreoli[1], Giovanni Battista Forleo[3], Marco Schiavone[3], Alessandro Depaoli[2], Chiara Valentina Lario[4], Giancarlo Ceccarelli[1], Gabriella DEttorre[1], Paolo Severino[1], Viviana Maestrini[1], Francesco Pugliese[1], Gioacchino Galardo[1], Grazia Loiuidice[1], Maria Tecla Pecci[1], Gaetano Maria De Ferrari[2], and Francesco Fedele[1]
[1]Policlinico Umberto I—Sapienza Università di Roma, [2]CITTÀ della Salute e Della Scienza—Torino, [3]Ospedale Luigi Sacco—Milano, [4]Ospedale Mauriziano Umberto I—Torino

Aims: In recent months every effort has been made to understand the possible interference of ACE-i or ARBs with ACE-2 receptor and SARS-CoV-2 pathway. Observational studies have shown no clinical impact of home therapy with ACE-i or ARBs on COVID-19, however these drugs are often discontinued upon hospitalization or diagnosis. to evaluate the influence of home therapy with RAAS inhibitors on the chest CT severity score and clinical presentation within 24 hours of diagnosis of SARS-CoV-2 infection, before stopping medications or starting specific therapy for COVID-19.
Methods and results: This is a multicenter, retrospective observational study. All admitted patients diagnosed with SARS-CoV-2 infection who performed chest CT within 24 hours of arrival were consecutively enrolled from March 1 to June 1, 2020. A severity score was attributed to Chest CT by two radiologists in blind to the patient's clinical information and, as validated by Ran Yang et al., a cut-off of 19.5 was considered to define severe radiological pneumonia. We included 593 patients and 156 were on home therapy with ACE-i/ARBs. In the ACE-/ARBs group 95% of patients were hypertensive and there was a higher prevalence of diabetes mellitus (ACE-i/ARBs: 26.3% vs non-ACE-i/ARBs 11.3% p < 0.01). Univariate and multivariate analysis showed that home therapy with ACE-i, ARBs or ACE-i/ARBs were not associated with the risk of CT severity score $\geq$ 19.5. Factors associated with CT score $\geq$ 19,5 were male sex (HR—95% CI—p =), Diabetes mellitus (HR—95% CI—p =), older age (HR—95% CI—p =), the presence of dyspnoea and worse PF ratio on arrival were also associated with severe radiological pneumonia. Furthermore, therapy with ACE-i, ARBs, ACE-i/ARBs was not associated with the risk of a more severe clinical presentation on arrival in terms of fever, dyspnoea, P/F ratio or intestinal symptoms. Finally, the same was true for the outcome of COVID-19 in terms of death, intubation or non-invasive ventilation. The results were consistent in the subgroup with hypertension.
Conclusion: ACE-i and ARBs do not influence the clinical and chest CT presentation of patients with COVID-19 at the time of diagnosis, before discontinuation of therapy or hospitalization.

349 Right ventricular function and pulmonary pressures as independent predictors of survival in patients with COVID-19 pneumonia

Franco Iodice[2], Antonello D'Andrea[1,2], Raffaella Scarafile[1], Lucia Riegler[1], Biagio Liccardo[2], Fabio Crescibene[3], Rosangela Cocchia[4], Eduardo Bossone[4], and Alessandro Serio[5]
[1]Dipartment of Cardiology and Intensive Coronary Unit" Umberto I" Hospital, Nocera Inferiore (Salern) Italy, [2]Dipartment of Cardiology University of Campania" Luigi Vanvitelli", Monaldi Hospital, Naples-Italy, [3]Division of Cardiology M. Scarlato Covid Hospital, Scafati (Salern), Italy, [4]Division of Cardiology Cardarelli Hospitalnaples-Italy, [5]Department of Sports Medicine, University of Naples Federico II, Naples, -Italy

Aims: We sought to determine the possible association of right ventricular (RV) function and pulmonary pressures with mortality in patients with COVID-19 pneumonia.
Methods and results: We studied 115 consecutive patients (64.6 mean age, range 20-88 years; 40% female) with positive SARS-CoV-2 laboratory test results and TC-confirmed interstitial pneumonia. We defined cardiac injury as high sensitivity Troponin I (hs-TNI - ECLIA method) blood levels above the 99th-percentile upper reference limit. RV end-diastolic basal and mid tract diameters, tricuspid annular plane systolic excursion (TAPSE), pulmonary artery systolic pressure (PASP), mean pulmonary artery pressure (mPAP), tricuspid inflow E/A ratio and tricuspid regurgitation peak velocity (TRV) were assessed. A total of 26 out of 115 patients had cardiac injury (mean age 73.5), had more frequently systemic hypertension (61.5% vs 29.2%; $P < 0.001$), higher levels of C-reactive protein (mean 98.8 [45.8-130.4] vs 38.9 [22.2-96.3] $mg \cdot L^{-1}$; $P < 0.001$) and of D-dimer (mean 4.8 [3.2-7.1] vs 2.1 [0.5-3.4] $mg \cdot L^{-1}$; $P < 0.001$); multiple ground-glass opacities in CT-findings (69.2%/33.7%) and multiple consolidations by lung ultrasound (76.6%/38.2%) were found. LV-diameters and ejection fractions were comparable between the two groups. Conversely, RV end-diastolic basal tract (35.8 ± 4.2 vs 31.2 ± 2.6, $P < 0.01$) and mid tract (32.4 ± 3.9 vs 28.6 ± 3.7, $P < 0.01$), TRV (3.4 ± 0.6 vs 2.9 ± 0.5; $P < 0.001$) and mPAP (29.6 ± 2.9 vs 23.6 ± 2.7; $P < 0.001$) were significantly increased in patients with cardiac injury, while tricuspid inflow E/A ratio (0.77 ± 0.5 vs 1.1 ± 0.6; $P < 0.01$) and TAPSE (15.4 ± 3.2 vs

20.3 ± 4.7; $P < 0.001$) were reduced. Patients with cardiac injury had a higher mortality than those without cardiac injury (50%/7.8%; $P < 0.0001$).
Conclusion: Increase of mPAP and RV dysfunction are associated with higher risk of in-hospital mortality in patients with COVID-19 pneumonia and cardiac injury.

156 Atrial fibrillation in a patient presenting with coronavirus disease-2019 (COVID-19) infection

Norman Lamaida[1], Giorgio Torella[1], and Antonio Cerciello[1]
[1]Clinica Trusso—Ottaviano—Napoli

SARS-CoV-2 is a novel virus that has spread rapidly throughout the world causing a potentially life- threatening disease, COVID-19, causing disproportionally high mortality among elderly patients with concomitant ulmonary and cardiovascular diseases. The clinical cardiovascular manifestations of covid-19 include elevation of cardiac biomarkers (ischaemic or non-ischaemic aetiology), cardiac arrhythmia, arterial and venous thromboembolism (VTE), and cardiogenic shock and arrest. Multiple mechanisms have been proposed to explain influenza triggering arrhythmias, among them severe systemic, arterial, and myocardial inflammatory reaction seems to be one of the most plausible. In patients with underlying ischaemic cardiomyopathy, the worsening of ischemia by increased oxygen demand and potential acute coronary syndromes led by influenza can also have a role in the increase of arrhythmic events. Furthermore, the systemic inflammatory response would make anticoagulation therapy for atrial fibrillation very complex.
Arrhythmia could be the first presentation of covid-19, and new-onset and/or progressive arrhythmia could indicate cardiac involvement.
We describe a case of a male presenting with COVI-19 infection who experienced atrial fibrillation (AF) which resolved with rate and rhythm control strategies, and supportive care.**Case Report:** A 80 -year-old male with....presented to the emergency room with a symptom of fever, shortness of breath and cough over the preceding 4 days. His Vital signs indicated heart rate of 160 beats/minute blood pressures of 160/90 mmHg, respiratory rate of 32 breaths per minute with an oxygen saturation of 86% on room air. A 12-lead electrocardiogram revealed atrial fibrillation and rate-related ST-T segment changes. A chest radiograph did not reveal any acute cardiopulmonary disease. Diagnostic laboratory investigations revealed a high D-dimer 500 ng/dl and pro-BNP: 600 pg/mL, while cardiac biomarkers were normal. In this room he was initiated on a amiodarone an 1 digoxin bolus. In the interim, the patient's COVID-19 test was positive. He reverted to normal sinus rhythm within 48 hours. This patient revealed several electrolyte abnormalities, including hypokaliemia, hypomagnesemia, all of which were aggressively repleted.
Further observational studies are required to characterize the nature and classification of arrhythmias in this COVID-19 pandemic.

614 Effects of COVID-19 on cardiovascular fellowship in Italy

Isabella Leo[1], Antonio Strangio[1], Carmen Anna Maria Spaccarotella[1], Francesco Barillà[2], Cristina Basso[3], Maria Pia Calabrò[4], Antonio Curcio[1], Pasquale Perrone Filardi[5], Massimo Mancone[6], Giuseppe Mercuro[7], Saverio Muscoli[8], Savina Nodari[9], Roberto Pedrinelli[10] Francesco Romeo[11], Gianfranco Sinagra[12], and Ciro Indolfi[1]
[1]Division of Cardiology, Department of Medical and Surgical Sciences, Magna Graecia, University, Catanzaro, Italy, [2]Deparment of Clinical, Internal, Anesthesiological, and Cardiovascular Sciences, University of Rome Sapienza, Rome, Italy, [3]Cardiovascular Pathology Unit, University of Padua, Padua, Italy, [4]Department of Human Pathology, University of Messina, Messina, Italy, [5]Department of Advanced Biomedical Sciencesfederico II University, [6]Sapienza University of Rome, Rome, Italy, [7]Department of Medical Sciences and Public Health, University of Cagliari, Cagliari, Italy, [8]Department of Medicine, tor Vergata University of Rome, Rome, Italy, [9]Department of Cardiology, University of Brescia and Asst Spedali Civili di Brescia, Brescia, Italy, [10]Cardiac, Thoracic and Vascular Department, University of Pisa, Pisa, Italy, [11]Department of Cardiovascular Disease, tor Vergata University of Rome, Rome, Italy, [12]Cardiovascular Department, University of Trieste, Trieste, Italy

Aims: Italy has been the first European Country to be hit hardly by the COVID-19 pandemic. It is probable that, in the midst of the emergency, the impact that the pandemic could have had on the training of cardiovascular fellows in training (FITs) has been overlooked. to investigate the perception of cardiovascular FITs about the effects of COVID-19 pandemic on cardiological education in Italy.
Methods and results: a 23-item survey has been created on Google form and subsequently sent to 1443 Italian cardiovascular Fellows in Training (FITs) registered on the database of the Italian Society of Cardiology (ISC). The participation was completely voluntary and the system has been set to avoid double entrees. 633 FITs - 44% of the Italian FITs in cardiology- completed the survey. 24.5% of respondents have been employed in COVID-19 units and 95% affirmed that the cardiological training program (clinical activities, didactics or both) has been somewhat changed during the pandemic (Fig 1a). For 61% of the FITs the COVID-19 had a negative effect on their education (Fig1b). Moreover, 59% of the respondents believe that they would not be able to completely fill the gap gained during that period over the rest of their training. The top five penalized aspects of cardiological education were frontal

teaching, participation to scientific conferences, training in advanced echocardiography, circulation within the training network and the acquisition of skills on outpatient clinic care. Preferred activities during the lockdown were studying, working on research projects and learning about SARS-CoV-2 infection. Finally, a negative impact on psycho-physical well-being has been reported by 86% of the trainees.

Conclusion: this is the first European survey on the impact of Covid-19 on cardiological training. The results of our survey demonstrate that cardiological education has been severely compromised by the pandemic, pointing out the urge to adapt the current training programs to the new scenario, in order to guarantee safety but at the same time an adequate education of FITs during the COVID-19 era.

Figure 1. Impact of COVID-19 on cardiological education

477　Prevalence and characteristics of myocardial injury during COVID-19 pandemic

Alessandro Maino[1], Enrico Di Stasio[1], Maria Chiara Grimaldi[1], Luigi Cappannoli[1], Erica Rocco[1], Federico Biscetti[1], Raffaele Landolfi[1], and Luigi Marzio Biasucci[1]
[1]Policlinico Universitario Agostino Gemelli

Aims: Coronavirus disease 2019 (COVID-19) is a pandemic disease that is causing a public health emergency due to its high rapid spread, to the high mortality rate, and the high percentage of patients requiring hospitalization and intensive care. According to limited information on cardiac complication of COVID-19, characteristics and clinical significance of myocardial injury remain unclear. In this study, we determined the pattern of high sensitivity troponin elevation in patients affected by SARS-CoV-2 and the prevalence of myocardial injury in this population; furthermore, we investigated the predictive value of Hs-Tn on disease severity and mortality.

Methods and results: This retrospective single-centre study analyzed all 758 patients in whom hs-TnI was determined in our hospital from 20 February 2020 to 09 April 2020. One hundred-eighty nine of these patients received SARS-CoV-2 diagnosis. Demographic data, laboratory findings, comorbidities, and treatments were collected and analyzed in patients with COVID 19. A total of 189 hospitalized patients with COVID-19 were included in the final analysis. The median age was 66 years old (SD 12) and 61 (32.35) were female. During the stay, a total of 28 patients (14.8%) needed admission in Intensive Care Unit and 32 patients (13.7%) died. The prevalence of myocardial injury in our COVID-19 population is of 16% (31 subjects out of 189). The patients with cardiac injury were older, and had a greater number of cardiovascular comorbidities, in particular history of hypertension and ischaemic heart disease; in addition, they had higher values of acute phase and inflammatory markers and leucocytes. The patients with hs-TnI above the 99th percentile cut-off required more frequently hospitalitation in ICU (10 [32.3%] vs 8 [11.4%]; P = .003) and the mortality rate was significantly higher (17 [54.8%] vs. 15 [9.5%], p<.001). A multiple regression analysis was carried out to investigate whether hs-TnI could significantly predict the degree of COVID-19 disease: hs-TnI and CRP contributed significantly to the model (B = . 0.525, p<.001; B=0.001, p=.020, respectively). In addition, we included 189 patients with complete data for all variables (32 non-survivors and 151 survivors) in the multivariable logistic regression model. We found that hs-Tn at admission, older age and CRP levels were associated with increased odds of death

Conclusion: Myocardial injury is prevalent in patients affected by SARS-CoV-2 and the patients with hs-Tn above the upper reference limit are older and had a greater number of cardiovascular comorbidities. In this study we demonstrate a high positive predictive value of hs-Tn for disease severity and in-hospital death. Therefore, it may be reasonable to use high sensitivity troponin as a screening tool in COVID-19 population in order to triage them into high and low risk groups.

327　Feasibility of remote home monitoring with a T-shirt wearable device in post-recovery COVID-19 patients

Carlo Vignati[1,2], Massimo Mapelli[1,2], Paola Gugliandolo[1], Daniela Fumagalli[3], Irene Mattavelli[1], Elisabetta Salvioni[1,2], Mauro Contini[1], Giovanni Berna[1], Luca Salvi[1], Gianluigi Longinotti-Buitoni[1], Elisabetta Mancini[1], Emilio Assanelli[1], Juliano Glauco[1], Anna Sudati[1], and Piergiuseppe Agostoni[1]
[1]Centro Cardiologico Monzino, IRCCS, Milano, [2]Università Degli Studi di Milano, Milano, [3] L.I.F.E.italia SRL

Aims: During the last months, a pandemic by a novel coronavirus (Sars-Cov-2) has spread worldwide, putting hospitals under enormous pressure. Although follow-up data in this setting are scarce, early reports suggested that more than 80% of patients who had recovered from COronaVIrus Disease 19 (COVID-19) reported persistence of at least one symptom during follow-up, particularly fatigue and dyspnoea. Therefore, a prolonged post-discharge monitoring for long-lasting effects is advisable. We assessed the feasibility of cardiorespiratory home monitoring through a wearable device in post-COVID-19 patients.

Table 1. Clinical characteristics and monitoring data of post-recovery COVID-19 patients

Figure 1A

Methods and results: in this pilot study, we enrolled subjects with a confirmed diagnosis of COVID-19 after hospital discharge at home. A wearable device used (L.I.F.E.) (a technologically advanced T-Shirt device composed of ink-based dry electrodes linked to standard 12-lead ECG monitoring, 5 respiratory strain sensors, 1 accelerometer, a digital pulse oximeter) was used. Monitoring was carried out for at least 7 days and comprehended a two-hour monitoring period a day during rest and a short exercise (6 minutes of brisk walking) and an overnight sleep monitoring on the last day. Seventeen COVID-19 patients (male 8; age 54.4 ± 15.3 year old; BMI 25.1 ± 3.1) were enrolled at hospital discharge. They underwent 12.5 ± 2.5 (7-17) days of monitoring. Clinical characteristics of the population and data monitoring are shown in Table 1. Twelve patients (70.6%) performed the nighttime monitoring. Among them, one showed an apnea-hypopnea index (AHI) of 20, suggestive of moderate sleep apnea syndrome.

Conclusion: Our study demonstrated that a post-discharge home monitoring program for COVID-19 patients is feasible and safe. The L.I.F.E. T-Shirt device was able to collect a full set of cardiorespiratory parameters (i.e. heart rate, a full ECG, respiratory rate, SpO2), both at rest and during a brief exercise. Finally, we were able to identify only one patient without any previous disease who presented post-COVID sleep apnea syndrome. Further studies are certainly needed to assess the prevalence and the clinical impact of this complication in post-COVID-19 patients.

397 "You can leave your mask on": effects on cardiopulmonary parameters of different airway protection masks

Fabiana De Martino[1] Massimo Mapelli[1,2], Elisabetta Salvioni[1], Irene Mattavelli[1], Paola Gugliandolo[1], Carlo Vignati[1,2], Stefania Farina[1], Pietro Palermo[1], Riccardo Maragna[1,2], Gerardo Lo Russo[1,2], Alice Bonomi[1], and Piergiuseppe Agostoni[1,2]
[1]Centro Cardiologico Monzino, [2]Università Degli Studi di Milano

Aims: In December 2019, in the city of Whuan (China), a potential new causative agent of pneumonia, called the new coronavirus 2019 (nCoV-2019) was identified. Since then, the need to contain the global spread of the infection has become urgent through specific social distancing procedures and through the use of individual protection devices (i.e. airway protection masks). In the media doubts were raised about the impact of different types of masks on daily physical activity, in particular for those who perform physical exercise. In this context, we aimed to evaluate cardiorespiratory parameters, assessable through a cardiopulmonary exercise test (CPET), to highlight any differences with the use of surgical mask or filtering facepiece particles class 2 (FFP2) mask compared to the test performed under normal conditions.

Methods and results: 12 healthy subjects, enrolled in July 2020, performed three consecutive CPETs at least 24 hours apart, but within 2 weeks, without wearing airway protection mask, with surgical mask and with FFP2 mask. The execution order of the CPETs was assigned in order to cover all possible combinations. During the CPETs, the consumption of Watts reached will be obscured to the subject. Before the start and immediately after the end of each CPET, Maximum Inspiratory Pressure (MIP) and the Maximum Expiratory Pressure (MEP) was also assessed. Comparing the three conditions, we observed a progressive significant reduction in oxygen intake, carbon dioxide output, ventilation and respiratory rate at rest as well as at peak exercise (table 1). The workload also decreased. We did not notice differences in blood oxygen saturation nor adverse events such as arrhythmias or ischaemic events. MIP/MEP comparison did not reveal significant respiratory muscles fatigue.

Table 1.

		Standard CPET	Surgical mask	FFP2 mask	p value ANOVA
Rest parameters	Heart rate (bpm)	73 ± 19	77 ± 14	75 ± 18	0.670
	SpO₂ (%)	97 ± 1	97 ± 1	97 ± 1	0.678
	VO₂ (ml/min)	355.3 ± 56.2	320.9 ± 77.8	275.9 ± 89.6	0.023
	VCO₂ (ml/min)	298.5 ± 52.1	255.5 ± 72.3	220.2 ± 68.2	0.017
	Respiratory rate (breath/min)	18.5 ± 3.2	15.2 ± 3.1	14.3 ± 3.6	0.006
	Tidal volume (L/min)	0.71 ± 0.1	0.71 ± 0.2	0.69 ± 0.2	0.918
	Ventilation (L/min)	12.9 ± 1.5	10.4 ± 1.8	9.3 ± 2.4	0.001
	MIP (cmH₂O)	81.8 ± 18.2	83.3 ± 16.6	85.2 ± 16.2	0.223
	MEP (cmH₂O)	82.6 ± 26.3	83.0 ± 23.8	80.8 ± 24.0	0.915
Peak exercise parameters	Heart rate (bpm)	170 ± 14	168 ± 16	167 ± 16	0.349
	SpO₂ (%)	97 ± 1	97 ± 1	95 ± 3	0.132
	VO₂ (ml/min/kg)	31 ± 6.7	27.5 ± 6.9	20.2 ± 8.8	0.001
	VCO₂ (ml/min)	2578 ± 796	2217 ± 690	2268 ± 794	0.016
	VE/VCO₂ slope	27.5 ± 3.7	28.1 ± 3.7	26.6 ± 5.0	0.388
	Respiratory rate (breath/min)	41.5 ± 8.0	37.7 ± 5.5	37.1 ± 4.5	0.041
	Tidal volume (L/min)	2.28 ± 0.7	2.05 ± 0.6	1.96 ± 0.6	0.001
	Ventilation (L/min)	92.3 ± 26.0	76.2 ± 21.8	71.6 ± 21.2	0.003
	MIP (cmH₂O)	80.6 ± 26.3	82.5 ± 23.0	84.9 ± 24.7	0.457
	MEP (cmH₂O)	75.9 ± 18.2	81.0 ± 29.1	78 ± 24.3	0.614
	RER	1.2 ± 0.1	1.1 ± 0.1	1.2 ± 0.1	0.665
	Power (watt)	194 ± 57	187 ± 52	184 ± 54	0.002

Conclusion: The use of airway protection masks during pandemics (e.g. nCoV-2019) is a key safeguard to contain viral transmission. In healthy subjects it reduces, both at rest and during exercise, ventilation values (mainly due to reduction of respiratory rate) without detectable alteration of arterial saturation, heart rate, respiratory muscle fatigue and/or adverse events even during a maximum effort. Our speculative hypothesis is that the effect is likely to be related to the presence of a mechanical obstacle to ventilation. Our data show that the use of masks is still compatible with the execution of physical activity even if the maximum workload is slightly reduced. In conclusion airway protection masks (both surgical mask and FFP2) can be safely used in daily life despite a slight impact on ventilation and metabolic parameters.

574 Telemedicine and remote home monitoring in COVID-19 era: a valuable surveillance tool for patients with cardiac devices

Andrea Matteucci[1], Michela Bonanni[1], Marco Centioni[1], Domenico Sergi[1], Gianluca Massaro[1], Federico Zanin[1], Valeria Cammalleri[1], Giuseppe Stifano[1], and Francesco Romeo[1]
[1]UOC Cardiologia Policlinico tor Vergata Roma

AIMS: In-hospital management of patients with cardiac implantable electronic device (CIEDs) has been a critical challenge since the early stages of COVID-19 outbreak. In order to safeguard public health, routine in-hospital controls of CIEDs were converted into remote home monitoring (HM). The aim of our study is to investigate the

impact of lockdown period on CIEDs patients and its influence on in hospital admissions through the analysis of HM data.

Methods and results: We analysed data recorded from 312 patients by HM during the national state of emergency related to COVID-19 and then we compared data from the same period of 2019. Emphasis has been given to heart failure alarms and arrhythmia alarms. We observed a significant reduction of remote monitoring events in 2020, when compared to 2019. Non-sustained ventricular tachycardia episodes decreased (18,3 VS 9,9% p = 0,002) as well as those for atrial fibrillation (29,2% VS 22,4% p = 0,019). In contrast, heart failure alarm activation was lower in 2019 than in 2020 (17% VS 25,3% p = 0,012). Nevertheless, hospital admissions for critical events recorded with CIEDs dropped in 2020, including those for heart failure.

Conclusion: HM has ensured the surveillance of patients with cardiac devices even when outpatient visits were not possible. Arrhythmic events decreased significantly compared to those observed in 2019. Similarly, hospital admissions have also decreased dramatically, including those for heart failure, despite the increased exacerbations of heart failure shown by HM.

505 Impact of coronavirus pandemia in the management of patients with severe cardiovascular disease: the experience of a cardiology outpatient clinic in Lombardy region

Francesco Fioretti[1], Giuliana Cimino[1], Antonio Milidoni[1], Angelica Cersosimo[1], Andrea Dell'Aquila[1], Mariangela Piazzani[1], Alberto Madureri[3], Laura Lupi[3], and Savina Nodari[2]
[1]University of Brescia, Italy, [2]ASST Spedali Civili Hospital and University of Brescia, Italy, [3]ASST Spedali Civili Hospital of Brescia, Italy

AIMS: During the lockdown period in Italy, from March 11th to May 4th 2020, a progressive increase in COVID-19 cases occurred in all Italian regions, in particular in the Lombardy Region. The current rise in COVID-19 cases has led to an increasing involvement of hospitals, in order to face the Coronavirus outbreak, shifting healthcare resources towards the management of COVID+ patients. This has led, on the other hand, to a progressive decrease in hospital admissions due to conditions not associated with SARS-CoV2 infection. At the same time, the regional governments have provided for the suspension of all outpatient activities, with the exception of the non-deferrable one. It was decided to postpone any elective intervention, referring to COVID free hospitals any urgent or emergency intervention. We aimed to verify the impact of coronavirus outbreak in the management of patients with high risk of morbidity and mortality, followed at the Cardiology Outpatient Clinic of our hospital, that was a Hub centre for COVID patients.

Methods and results: We compared the total number of Day Hospital (DH) visits for worsening heart failure (WHF), severe aortic stenosis waiting for Transcatheter Aortic Valve Implantation (TAVI) and atrial fibrillation (AF) requiring electrical cardioversion (ECV) between March 4th and May 4th of 2019 with those that refer to the same period in 2020. Then, we evaluated the same data in the 30 days following the end of the lockdown (May-June 2020). As reported in Table 1, the number of DH visits during March-May 2019 was approximately double compared to the ones in the same interval time in 2020 (81 vs 34 patients). Instead, in just one month (18/05-18/06/2020) there was a significant increase in the number of accesses for WHF (globally 22), if compared with those (21 in total) during the entire lockdown (lasting three months, from 04/03 to 04/05/2020).

Conclusion: These data confirm how the COVID outbreak impacted negatively on the appropriate management and timing of therapeutic intervention for severe cardiovascular disease, in particular those with high risk of events and mortality, especially in the regions with highest number of hospitalizations and deaths for SARS-CoV2.

Table 1   Number of MAC accesses in the indicated periods.

Table 1. Number of MAC accesses in the indicated periods.
Legend: C = heart failure; T = TAVI; F = atrial fibrillation
■ March-May 2019   ■ March-May 2020   ■ May-June 2020

393 Arrhythmic burden in COVID19 patients outside the ICU—experience of a third-level center

Giovanni Peretto[1], Simone Sala[1], Alberto Zangrillo[1], Simone Gulletta[1], and Paolo Della Bella[1]
[1]IRCCS San Raffale Hospital And University, Milan, Italy

Aims: No studies investigated the prevalence of arrhythmias among clinically-stable patients affected by COVID-19.

Methods and results: We assessed prevalence, type, and burden of arrhythmias, by a single-day snapshot in seven non-intensive COVID Units at a third-level centre. We enrolled 132 inhospital patients (mean age 65 ± 14 y; 66% males) diagnosed with COVID-19 infection. Arrhythmic episodes were detected in 12 patients (9%). In detail, 8 had atrial fibrillation, and 4 self-limiting supraventricular tachyarrhythmias. There were no cases of ventricular arrhythmias or new-onset atrioventricular blocks. In addition, we report no patients with QTc interval > 450 ms.

Conclusion: Our single-day snapshot survey suggests that the prevalence of arrhythmias among clinically stable COVID-19 patients is low. In particular, no life-threatening arrhythmic events occurred.

284 Segmental and global longitudinal strain differences between children with paediatric inflammatory multisystemic syndrome temporally associated with SARS-CoV-2 pandemic and Kawasaki disease: preliminary data from an ongoing study

Enrico Piccinelli[1], Alain Fraisse[1], Heechan Kang[1], Carles Bautista-Rodriguez[1], and Giovanni Di Salvo[1]
[1]Royal Brompton Hospital

Aims: The paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) and Kawasaki disease (KD) have overlapping features. This study aimed to describe the strain segmental analysis among both entities.

Methods and results: Retrospective review of strain segmental analysis within 4 weeks of presentation of symptoms among children diagnosed with PIMS-TS between April and June 2020 and a historic cohort of typical KD from the Royal Brompton Hospital, London. We included 33 PIMS-TS patients (23 males, 69.7%) at a mean age of $5,8 \pm 4,5$ years old and 45 KD patients (31 males, 68,9%) at a mean age of $8 \pm 4,9$ years old. Left ventricle ejection fraction (LVEF) was normal in both groups (63,3% vs 63,5%; $p = 0,89$), 4/33 PIMS-TS children (12,1%) had coronary arteries abnormalities (CAA), whereas 100% of KD cohort had CAA. Both groups had a normal global longitudinal strain (GLS), but in KD it was significantly reduced compared to the PIMS-TS group (-20% vs -22%; $p = 0,008$). Basal segments were the most affected in KD with significant difference in the basal anterior and anterolateral strain compared to PIMS-TS (respectively -18,2% vs -23,4%; $p < 0,001$ and -16,7% vs -22,7%; $p < 0,001$). KD had a greater anterior, anterolateral and posterior segments involvement with a significant reduction in the anterolateral mid-wall longitudinal strain (-18,3% vs -22%; $p = 0,002$). Apical segments were less involved, with significant difference only in the septal and inferior apical strain (respectively $p = 0.001$ and $p = 0,032$).

Conclusion: These preliminary data showed that after 4 weeks from the onset of symptoms, all PIMS-TS patients had a normal LVEF and GLS and different segmental involvement compared to KD cohort. We hypothesize that these findings may be related to direct myocardial damage in PIMS-TS rather than caused by coronaries perfusion abnormalities.

584 The value of ECG changes in risk stratification of COVID-19 patients

Luca Bergamaschi[1], Matteo Armillotta[1], Emanuela Concetta D'Angelo[1], Pasquale Paolisso[1], Sebastiano Toniolo[1], Michele Fabrizio[1], Francesco Angeli[1], Francesco Donati[1], Ilenia Magnani[1], Andrea Rinaldi[1], Chiara Chiti[1], Andrea Stefanizzi[1], Mauro Biffi[1], Carmine Pizzi[1], and Nazzareno Galié[1]
[1]Unit of Cardiology, Department of Experimental, Diagnostic and Specialty Medicine, University of Bologna, Italy, [2]Unit of Infectious Diseases, Department of Medical and Surgical Sciences, S. Orsola Hospital, University of Bologna, Italy

Aims: There is growing evidence of cardiac injury in COVID-19. Our purpose was to assess the prognostic value of serial electrocardiograms in COVID-19 patients.

Methods and results: We evaluated 269 consecutive patients admitted to our Centre, with confirmed SARS-CoV-2 infection. ECGs available at admission and after one week from hospitalization were assessed. We evaluated the correlation between ECGs findings and major adverse events (MAE) as the composite of intra-hospital all-cause mortality or need for invasive mechanical ventilation. Abnormal ECGs were defined if primary ST-T segment alterations, left ventricular hypertrophy, tachy or bradi- arrhythmias and any new AV, bundle blocks or significant morphology alterations (e.g. new Q pathological waves) were present. Abnormal ECG at admission (106/216) and elevated baseline troponin values were more common in patients who developed MAE ($p = 0.04$ and $p = 0.02$, respectively). Concerning ECGs recorded after 7 days (159), abnormal findings were reported in 53.5% of patients and they were significantly more frequent in those with MAE, as shown in Figure 1.

Among abnormal ECGs, ischaemic alterations and left ventricular hypertrophy were significantly associated with a higher rate of MAE.

The multivariable analysis showed that the presence of abnormal ECG at 7 days of hospitalization was an independent predictor of MAE (HR 3.2; 95% CI 1.2-8.7; $p = 0.02$). Furthermore, patients with abnormal ECG at 7 days more often required transfer to intensive care unit ($p = 0.01$) or renal replacement therapy ($p = 0.04$).

Conclusion: Patients with COVID-19 should receive ECG at admission but also during their hospital stay. Indeed, electrocardiographic alterations during hospitalization are associated with MAE and infection severity.
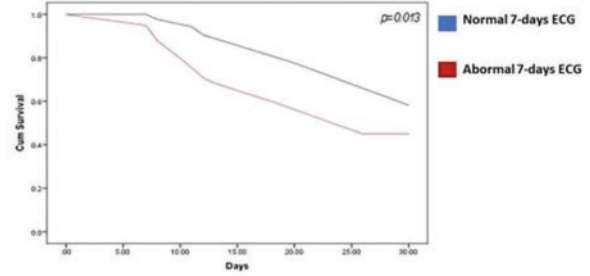
Figure 1 Kaplan-Meier Curves for Primary Outcome of MAE.

525 Endothelial dysfunction in COVID-19 patients assessed with endo-Pat2000

Giuliana Cimino[1], Emiliano Calvi[1], Edoardo Pancaldi[1], Greta Pascariello[1], Nicola Bernardi[1], Riccardo Maria Inciardi[1], Enrico Vizzardi[1], Riccardo Raddino[1], and Marco Metra[1]
[1]Università Degli Studi di Brescia

Aims: It has been widely reported that SARSCoV-2 attaches human cells by using the ACE2 receptor, which is expressed in several organs, including the endothelial cells. Whether vascular impairment described during COVID-19 infection is primarily due to the direct involvement of the endothelial cells by the virus or secondarily to the inflammatory host response is currently unknown, but there is evidence that SARS-CoV-2 can directly infect human blood vessel. We therefore aimed to demonstrate in vivo the presence of endothelial dysfunction in COVID-19 patients without cardiovascular risk factors or pre-existing cardiac conditions.

Methods and results: We used the Endo-PAT 2000, a device able to measure endothelial vasodilation function in a rapid and noninvasive way. The device records endothelium-mediated changes in the digital pulse waveform known as the Peripheral Arterial Tone (PAT) signal, measured with a pair of plethysmographic probes situated on the index finger of both patient's hands. Endothelium mediated changes in the PAT signal are elicited by creating a downstream hyperemic response, induced by blood flow occlusion in the brachial artery for 5 minutes using an inflatable cuff on one arm. The response to reactive hyperemia is evaluated automatically by the device, and a PAT ratio is calculated using the post- and pre-occlusion PAT values relative to the occluded arm (compared to the measurements from the contralateral arm, which serves as control for non endothelial dependent systemic effects). The Reactive Hyperaemia Index (RHI) is then calculated as the ratio of Pulse Wave Amplitude (PWA) measured during the 60-second period after cuff deflation divided by the average PWA measured before cuff inflation; RHI values below 1.67 are suggestive of endothelial dysfunction. We evaluated six patients with laboratory-confirmed SARS-CoV-2 infection with a mean age of 75.8 years. Five of them were female (83.3%); the average mean arterial pressure was 87 mmHg (normal values 70-110 mmHg). Blood sample tests revealed an inflammatory state in all patients, with high plasma levels of C-reactive protein, fibrinogen, ferritin, LDH, and D-dimer. Overall, four patients were positive for endothelial dysfunction, with RHI values between 1.13-1.56 (average value 1.32, normal values >1.67); in one of the two negative patients the reported RHI value was slightly above the cutoff (1.72).

Conclusion: Our findings confirm that COVID-19 patients are at higher risk of developing endothelial dysfunction. In addition, our results demonstrate that endothelial impairment may occur even in the absence of cardiovascular risk factors. Endothelial dysfunction may play a pivotal role in the pathophysiology of the infection process and may identify a subset of patient at a higher risk of worse outcome. In a small series of patients who died from COVID-19, severe endothelial injury associated with intracellular virus detection, disruption of endothelial cell membranes, widespread pulmonary vascular thrombosis and occlusion of alveolar capillaries with significant new vessel growth, was observed. Early recognition of endothelial impairment at an early stage of the disease appears critical. Whether the evidence of endothelial dysfunction, through noninvasive approaches, can predict worse clinical outcomes or higher risk of thromboembolic events needs to be proven by recruiting a larger number of affected patients. Nevertheless, our results contribute to the knowledge of the pathophysiological mechanisms related to COVID-19 infection.

605 Remote cardiac care in COVID-19 epoch: our experience with V-lap device in advanced heart failure patients

Attilio Restivo[1], Giuseppe Princi[1], Daniele Rodolico[1], Francesco Canonico[1], Nadia Aspromonte[1], Carlo Trani[1], Filippo Crea[1], and Domenico D'Amario[1]
[1]Department of Cardiovascular Sciences, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy

The outbreak of COVID-19 has imposed disruptive changes in cardiovascular care worldwide: the usual modalities of care delivery for HF patients have been

implemented, promoting preventive measures, minimizing in-person contacts, reducing patients' and health care providers' risk of exposure. This unprecedented scenario has accelerated the transition towards telemedicine as a way to provide safe, accountable, and effective care in HF. A paradigmatic example is the chronic HF management through remote telemonitoring of left atrial pressure (LAP) using the V-LAP™ device (Vectorious Medical Technologies), currently tested at our centre under the VECTOR-HF first-in-man clinical study.

The study population consists of patients in NYHA functional class III who have a history of hospitalization for worsening HF or elevated ambulatory levels of BNP/N-terminal pro BNP. The device is implanted under fluoroscopy and TEE-guidance in a trans-septal fashion. Once implanted, the battery-free interatrial device captures the LAP, that is collected by means of an external belt, sending data to the cardiologist via a cloud-based system. After 90 days, right heart catheterization confirms the accuracy of LAP measurements as compared to pulmonary capillary wedge pressure. Once the reliability is confirmed, LAP can be used to guide optimization of medical therapy.

In our centre, three patients have been enrolled so far: 1) The first V-LAP™ was implanted in Jun 2019 in a 75yo patient with severely reduced LVEF (25%), and frequent HF hospitalizations. At 16 months, NYHA functional class improved (from III to II) along with an amelioration of both the 6-minute walking test and the perceived quality of life, according to KCCQ questionnaire. 2) The second patient is a 70yo patient suffering from HFrEF in dilated ischaemic cardiopathy, LVEF 30%, NYHA III, with multiple readmissions for HF worsening. He underwent implantation in Feb 2020. At 8 months, NYHA functional class improved (from III to II). 3) The third patient was implanted in Sep 2020. He is a 65yo patient with non-obstructive hypertrophic cardiomyopathy, LVEF 28%, NYHA III, with several HF related hospitalizations. We eagerly wait for his data to be available after 3-months-right heart catheterization. However, he had no clinical worsening to date.

During the course of COVID-19 pandemic, remote analysis of LAP curves led to earlier detection of underlying disease progression preventing clinical decompensation: when a rise in mean LAP was observed, diuretic therapy was modified accordingly (see example below from first patient). Among our patients, no hospital readmissions occurred over COVID-19 era, avoiding medical contacts and in-hospital exposure. Moreover, the V-LAP™ system showed remarkable reliability and easiness of use, encouraging patients to adhere with a high compliance rate (>99%).
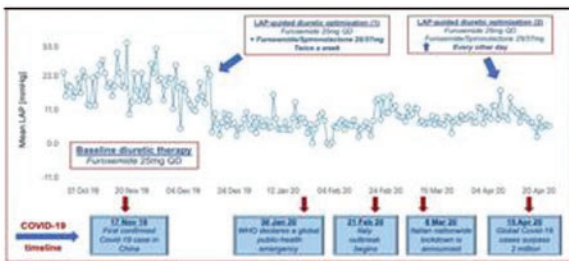
417 Mortality risk assessment using CHA(2)DS(2)-VASC scores in patients hospitalized with COVID-19 infection

Gaetano Ruocco[1], Peter Mccullough[2], Kristen Tecson[2], Massimo Mancone[3], Gaetano Maria De Ferrari[4], Fabrizio D'Ascenzo[4], Francesco De Rosa[4], Anita Paggi[5], Giovanni Forleo[6], Gioel Secco[7], Gianfranco Pistis[7], Silvia Monticone[4], Marco Vicenzi[8], Irene Rota[8], Francesco Blasi[8], Francesco Pugliese[9], Francesco Fedele[3], and Alberto Palazzuoli[10]

[1]Cardiology Division, Regina Montis Regalis Hospital, ASL-CN1, Mondovi, Cuneo, Italy, [2]Baylor University Medical Center, Dallas, TX, USA, [3]Sapienza University of Rome, Rome, Italy, [4]University of Turin, Turin, Italy, [5] ASSST Nord Milano e Bassini Hospital, Cisanello Balsamo, Milan, Italy, [6]Azienda Ospedaliera- Polo Universitario Luigi Sacco, Milan, Italy, [7]Azienda Ospedaliera SS Antonio e Biagio e Cesare Arrigo, Alessandria, Italy, [8]University of Milan, Milan, Italy, [9]Paride Stefaninirome, Italy, [10]Cardiovascular Diseases Unit, Department of Internal Medicine, Le Scotte Hospital, University of Siena, Siena, Italy

Aims: Early risk stratification is needed for complications and death related to COVID-19 infection. Because many patients with COVID-19 who developed acute respiratory distress syndrome have diffuse alveolar inflammatory damage associated with microvessel thrombosis, we aimed to investigate a common clinimetric tool the CHA(2)DS(2)-VASc in the prognostication of outcomes in COVID-19 patients.

Methods and results: We analyzed consecutive patients from a multicenter observational registry, CORACLE, which contains data of patients hospitalized for COVID-19 infection in 4 regions of Italy, according to data-driven tertiles of admission CHA(2)DS(2)-VASc score. The primary outcomes were inpatient death and a composite of inpatient death or invasive ventilation. Of 1045 patients in the registry, 864(82.7%) had data available to calculate CHA(2)DS(2)-VASc score and were included

in the analysis. Of these, 167(19.3%) died, 123(14.2%) received invasive ventilation, and 249(28.8%) had the composite outcome. Stratification by CHA(2)DS(2)-VASc tertiles (T1: ≤1; T2: 2-3; T3: ≥4) revealed increases in both death (8.1%, 24.3%, 33.3%, respectively; p < 0.001) and the composite endpoint (18.6%, 31.9%, 43.5%, respectively; p < 0.001). The odds ratios(ORs) for mortality and the composite endpoint for T2 patients vs. T1 CHA(2)DS(2)-VASc score were 3.62(95% CI : 2.29-5.73, p < 0.001) and 2.04(95% CI : 1.42-2.93, p < 0.001), respectively. Similarly, the ORs for mortality and the composite endpoint for T3 patients vs. T1 were 5.65(95% CI : 3.54-9.01, p < 0.001) and 3.36(95% CI : 2.30-4.90, p < 0.001), respectively.

Conclusion: Among patients hospitalized for COVID-19 infection, the CHA(2)DS(2)-VASc risk score for thromboembolic events was able to prognosticate both inpatient mortality and the composite of inpatient mortality or the requirement of invasive ventilation. Whether this score may be extensively used in other population with different clinical risk profile is a challenge for future research**qs.**

288 TC interval prolongation and life-threatening arrhythmias in patients with COVID-19. Results from a multi-centre prospective registry

Francesco Santoro[1], Francesco Monitillo[2], Pasquale Raimondo[5], Agostino Lopizzo[3], Luigi Fm Di Martino[1], Luigi Di Biase[6], and Natale Daniele Brunetti[1]

[1]Dipartimento di Cardiologia, Ospedali Riuniti, Universita' di Foggia, [2]UOC Cardiologia, Policlinico Universitario, Bari, [3]Dipartimento di Cardiologia, Ospedale San Carlo, Potenza, [4]ASL Bat, [5]Dipartimento di Anestesia Rianimazione, Policlinico Universitario, Bari, [6]Albert Einsteinmontefiore Hospital, USA, NYC

Aims: Prolonged QTc interval and life-threatening arrhythmias (LTA) are potential drug induced complications previously reported with antimalarial, antivirals and antibiotics. To evaluate prevalence and predictors of QTc interval prolongation and incidence of LTA during hospitalization for COVID-19.

Methods and results: 154 consecutive patients were enrolled in a multicenter international registry. 12-lead ECG was performed at admission, after 7 and 14 days; QTc values were analyzed. Fifteen (14%) patients developed a prolonged-QTc (pQT) after 7 days (mean QTc increase 66 ± 20msec, +16%, p < 0.001); these patients were older, had higher basal heart rates, higher rates of paroxysmal atrial fibrillation, lower platelet count. QTc increase was inversely proportional to baseline QTc levels and leukocyte count and directly to basal heart rates (p < 0.01).

At multivariate stepwise analysis including age, male gender, paroxysmal atrial fibrillation, basal QTc values, basal heart rate and dual antiviral therapy, age (OR 1.06, 95% C.I. 1.00-1.13, p < 0.05), basal heart rate (OR 1.07, 95% C.I. 1.02-1.13, p < 0.01) and dual antiviral therapy (OR 12.46, 95% C.I. 2.09-74.20, p < 0.1) were independent predictors of QT-prolongation.

Incidence of LTA during hospitalization was 3.9%. Three pts experienced cardiac arrest and three non-sustained VT. LTAs were recorded after 14 ± 7 days from hospitalization and were associated with poor outcome with 66% of mortality rate.

Conclusion: After 7 days of hospitalization, 14% of patients with Covid-19 developed pQTc; age, basal heart rate and dual antiviral therapy were found as independent predictor of pQTc. Life threatening arrhythmias have an incidence of 3.9% and were associated with poor outcome**a**e.

292 Nticoagulation therapy in patients with covid-19. Results from a multi-centre international prospective registry (HOPE-COVID19)

Francesco Santoro[1], Ivan Nunez[2], Martino Pepe[3], Vicente Estrada[2], and Natale Daniele Brunetti[1]

[1]Dipartimento di Cardiologia, Universita' di Foggia, [2]Hospital Clinico San Carlos, Madrid, Spagna, [3]DIMO, Policlinico Universitariobari

Aims: No standard therapy is currently recommended for corona-virus-19 disease (COVID-19). Several drug approaches, including anticoagulation (AC), have been proposed in small case series. Aim of the study was to evaluate the efficacy of AC in COVID-19 hospitalized patients and its impact on survival.

Methods and results: 5838 patients were enrolled in a multicenter-international prospective registry (HOPE-COVID19). Demographic and clinical data including drug therapy and in-hospital complications were recorded.

5480 (94%) patients did not receive any AC before hospitalization. In the overall cohort AC therapy during hospitalization was not associated with better survival rate (81 vs 81%, p = 0.94), but with higher risk of bleeding (2.7 vs 1.8%, p = 0.03).

Among patients admitted with respiratory failure (49%, n = 2859 pts), AC started during hospitalization was associated with lower mortality rates (32 vs 42%, p < 0.01) and non-significant higher risk of bleeding (3.4 vs 2.7%, p = 0.3).

AC therapy was associated with lower mortality rates in patients treated with invasive ventilation (53 vs 64%, p = 0.05) without increased rates of bleeding (9 vs 8%, p = 0.88), but not in those with non-invasive ventilation (35 vs 38%, p = 0.40).

At multivariate Cox' analysis mortality relative risk with AC was 0.58 (95% CI 0.49-0.67) in patients admitted with respiratory failure, 0.50 (95% CI 0.49-0.67) in those requiring invasive ventilation, 0.72 (95% CI 0.51-1.01) in non-invasive ventilation.

Conclusion: AC therapy in general population with COVID-19 is not associated with better survival rates but with higher bleeding risk. Better results can be observed in patients admitted with respiratory failure and requiring invasive ventilation.

166 Exosomal micrornas drive pulmonary thromboembolism in Covid-19

Jessica Gambardella[1,3], Celestino Sardu[2], Paolo Maggi[2], Raffaele Marfella[2], Marco Bruno Morelli[3], Vincenzo Messina[2], Giuseppe Paolisso[2], Xujun Wang[3], and Gaetano Santulli[1,3]
[1]Federico Ii University—Itme, [2]Vanvitelli University, [3]Einstein College of Medicine—Montefiore University Hospital

Aims: Thromboembolic events have been shown to play a key role in the outcome of COVID-19. The analysis of the exosomal cargo, including microRNAs (miRNAs), may provide a unique view into relevant diseases or define new diagnostic/prognostic potential. Emerging evidence has shown that exosomal miRNAs are involved in a number of physiologic and pathologic processes. However, neither exosomes nor miRNAs have been hitherto investigated in COVID-19.

Methods and results: To test the hypothesis that exosomal miRNAs are a key determinant of pulmonary thromboembolism (PTE) in COVID-19, we enrolled COVID-19 patients with signs and symptoms suggestive of PTE. The study was approved by the local Ethical Committee and informed consent was obtained. Circulating exosomes were isolated from these patients on admission following established protocols and levels of the top three exosomal miRNAs from a panel to profile human miRNAs were validated by RT-qPCR. Patients were divided in two groups based on the confirmed or non-confirmed diagnosis of PTE, obtained by high-resolution computed tomography and/or angiogram, in order to verify the presence of pulmonary micro/macro-thrombi. When comparing patients with confirmed PTE *vs* patients without PTE, we found that D-dimer, age, and diabetes mellitus were different ($P < 0.05$), corroborating the key role of these factors in the pathogenesis of PTE; we also found that levels of exosomal miR-103a, miR-145, and miR-885 were significantly different between these populations. Mechanistically, Tissue Factor has been identified as a direct target of miR-145, while miR-885 targets the von Willebrand Factor. Equally important, low levels of miR-103a have been observed in deep vein thrombosis, although a precise mechanism explaining such a relationship has not been fully defined. An inverse correlation between exosomal miR-145 and D-dimer was also evident (R^2: 0.4458, $P = 0.0002$). Strikingly, using a stepwise multiple regression analysis, correcting for age, diabetes, hypertension, and D-dimer, exosomal miR-145 was confirmed as an independent predictor of PTE [B: -3.140, Wald: 6.047, 95% C.I. for EXP2: 0.004-0.529; $P = 0.014$].

To our knowledge, this is the first study showing an association between exosomal non-coding RNA and PTE in COVID-19 patients. Since endothelial dysfunction has been shown to be a prominent hallmark of COVID-19 and to contribute to the pro-thrombotic and pro-inflammatory state of the vasculature, we speculate that a main source could be represented by endothelial cells and/or platelets, which are known to express miR-145, miR-103a, and miR-885 in normal conditions. Moreover, endothelial cells express the main co-factors required by SARS-CoV-2 to enter the host cells, including angiotensin-converting enzyme 2 (ACE2) and transmembrane serine protease 2 (TMPRSS2).

Conclusion: We identified an unprecedented significant association between exosomal miRNAs and TPE, which could be helpful to better understand the molecular mechanisms underlying TPE pathophysiology, as well as to identify patients who are at risk of developing PTE. Consistent with our findings, in a series of COVID-19 autopsies, PTE has been shown to be a fundamental feature, strongly indicating that thrombosis plays a crucial role in the disease process and in its outcome. Further analyses are warranted to ratify our results and prospectively evaluate their prognostic value.

573 Impact of COVID-19 on ventricular arrhythmias

Marco Silenzi[1], Samuele Principi[1], Paolo Compagnucci[1], Michela Casella[1], Federico Guerra[1], and Antonio Dello Russo[1]
[1]Università Politecnica delle Marche

Aims: The COVID-19 pandemic has affected the hospital management of many diseases. The rapid spread of the virus and the serious clinical conditions of patients requiring intensive care have caused a reorganization of activities in hospital facilities: in the electrophysiology (EP) laboratory, interventional procedures have been postponed in elective cases, giving priority to clinical emergencies, such as catheter ablation (CA) for electrical storm (ES). As of today, there has been no clear scientific evidence correlating the SARS-CoV-2 infection with fatal or near-fatal arrhythmias, such as ventricular tachycardia (VT) and electrical storm (ES). We sought to evaluate how the numbers of CA for ES and VT have changed in the COVID-19 period, as compared to the pre-COVID-19 era.

Methods and results: We conducted a single-centre, retrospective, observational study. We enrolled two groups of patients undergoing EP procedures of CA for ES and VT at the University Hospital "Ospedali Riuniti" in Ancona, Italy, a tertiary-level referral centre. The first group includes patients undergoing CA for ES and VT in the six months preceding the COVID-19 pandemic (September 9, 2019-March 8, 2020). The second group includes patients undergoing the same procedures in the first six month of the COVID-19 emergency (March 9, 2020-September 9, 2020). March 9, 2020 was chosen to mark the beginning of the COVID-19 era because this was the day when novel health care measures were taken in the cardiology department of our hospital. Each subject in Group B was evaluated with polymerase chain reaction (PCR) tests for SARS-Cov-2 on throat swabs before CA procedures. We enrolled 40 patients undergoing CA procedures for ES and VT. More CA procedures were performed during the COVID-19 period, as compared to the pre-COVID-19 period (27 vs 13 patients). This difference was mainly driven by an increase in CA for ES during the COVID-19 period (16 vs 7). Furthermore, PCR tests for SARS-Cov-2 on throat swabs were negative in all patients.

Conclusion: Our data suggest that during the COVID-19 emergency, there was an increase of non-deferrable EP procedures, such as CA for ES. We suppose two possible explanations. Firstly, the COVID-19 emergency may have worsened the assistance to patients with chronic diseases, both due to the channeling of resources in the COVID-19 emergency and to the need to minimize interpersonal contacts, including non-urgent visits; this may have indirectly facilitated the development of ES. Secondly, despite the negative results of SARS-Cov-2 throat swabs, a previous COVID-19 cannot be completely ruled out, raising the possibility that the virus may have also acted directly, setting the stage for ES. Further studies are needed in order to examine in depth the multiple possible relationships between COVID-19 and arrhythmogenesis.
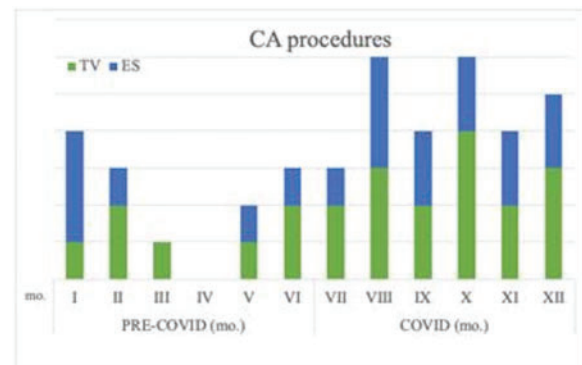
88 Severe COVID-19 in a patient with late presentation stemi: a double-edged sword

Giorgio Solfanelli[1], Massimo Volpe[1], Allegra Battistoni[1], Simone Reale[1], Sara Corradetti[1], and Enrico Rathina Raj[1]
[1]Universita' La Sapienza di Roma, Facolta' di Medicina e Psicologia

Although the emergent COVID-19 is usually dominated by respiratory symptoms, COVID-19 patients may also develop cardiovascular complications, which may even become the ultimate cause of death. Indeed, several studies have been reported a strict correlation between SARS-CoV-2 infection and the increase of mortality and morbidity in cardiovascular patients. Moreover, the late presentation and management of acute coronary syndromes due to the fear of being infected in healthcare structures during this pandemic have led to worse cardiovascular outcomes.

A 62-year-old man with no previous disease, admitted with respiratory failure caused by SARS-CoV-2 interstitial pneumonia (Fig. 1), incurred in a cardiogenic shock due to a severe left ventricular dysfunction with several episodes of sustained ventricular tachycardia. The EKG showed Q-waves with ST-segment elevation as for a late presentation STEMI (Fig. 2) and the echocardiogram confirmed left ventricle dysfunction and septal-apical aneurism (Fig. 3). As soon as the patients could speak, he referred an episode of angina a couple of weeks before the admission to the hospital, but he avoided seeking help because afraid of being exposed to SARS-CoV-2 in healthcare structures. The in-hospital management of this patient has been challenging. Despite a complete coronary revascularization of the left anterior descending artery, the patient had to undergo a defibrillator implantation in secondary prevention and his prognosis remained poor due to the several impairment of left ventricular ejection fraction and the lung interstitial fibrosis.

From this single case, two major lessons can be learned: (1) the course of COVID-19 may be complicated by concomitant critical cardiovascular conditions, such as a recent acute myocardial infarction; (2) late presentation and management of acute myocardial infarction may be the consequence of the fear of the contagion during a pandemic. Therefore there is need for a specific health protocol for acute condition in the perspective of a new pandemic phase.
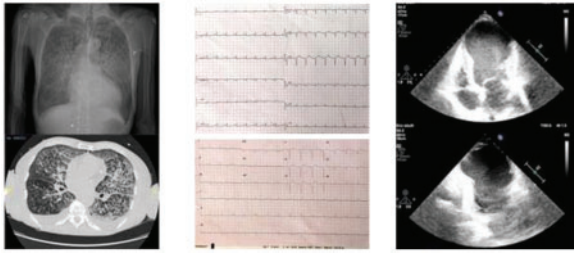
Figure 1, 2 and 3.

615 Future perspectives of Italian cardiologists in training: a nationwide survey

Antonio Strangio[1], Isabella Leo[1], Carmen Anna Maria Spaccarotella[1], Francesco Barillà[2], Cristina Basso[3], Maria Pia Calabrò[4], Antonio Curcio[1], Pasquale Perrone Filardi[5], Massimo Mancone[6], Giuseppe Mercuro[7], Saverio Muscoli[8], Savina Nodari[9], Roberto Pedrinelli[10], Francesco Romeo[11], Gianfranco Sinagra[12], and Ciro Indolfi[1]

[1]Division of Cardiology, Department of Medical and Surgical Sciences, Magna Graecia University, Catanzaro, Italy, [2]Department of Clinical, Internal, Anesthesiological, and Cardiovascular Sciences, University of Rome Sapienza, Rome, Italy, [3]Cardiovascular Pathology Unit, University of Padua, Padua, Italy, [4]Department of Human Pathology, University of Messina, Messina, Italy, [5]Department of Advanced Biomedical Sciencesfederico II University, [6]Sapienza University of Rome, Rome, Italy, [7]Department of Medical Sciences and Public Health, University of Cagliari, Cagliari, Italy, [8]Department of Medicine, Tor Vergata University of Rome, Rome, Italy, [9]Department of Cardiology, University of Brescia and Asst Spedali Civili di Brescia, Brescia, Italy, [10]Cardiac, Thoracic and Vascular Department, University of Pisa, Pisa, Italy, [11]Department of Cardiovascular Diseasetor Vergata University of Rome, Rome Italy, [12]Cardiovascular Department, University of Trieste, Trieste, Italy

Aims: adequate specialist training is the basis of a health system capable of supporting the continuous expansion of the population's demand for assistance. The continuous scientific advances, technological innovations, and the recent outbreak of a pandemic lead to a reshaping of training courses in order to guarantee a high standard of quality of care. evaluating the feedback provided by Italian cardiologists in training about the current educational program and analyzing their perspectives about the future.

Methods and results: we performed a 23-item national survey that has been delivered to 1443 Italian Fellow in Training (FITs), registered in the database of the Italian Society of Cardiology (ISC). The survey has been available online for 33 days (from 12 of June to 15 of July 2020). The impact of COVID-19 on medical education has been the original principal topic of the questionnaire, but we took advantage of this opportunity to investigate the perception of the trainees about their future work and training. 633 cardiologists in training (44% of the FITs) participated to the survey. 45% of the participants affirmed to be completely satisfied by the current training program. 24% of respondents affirmed to have a totally inadequate or inadequate expertise on treating cardiovascular emergencies. 83% claimed to be interested in a working experience abroad but only 24% would remain lifelong in another Country. We asked the future cardiologists an opinion about the possibility of an early access to the world of work, starting from the third year of residency, provided from two recent Italian decrees ("Calabria" and "Milleproroghe"). 63% of the respondents believe that this chance does not represent an overall advantage and for 83% of them the early abandonment of the Universities could jeopardize a thorough cardiological training. Sub-specializations such as interventional cardiology and echocardiography emerged as the main topics of interest for the future careers of the FITs; however, general cardiology has been indicated as the third most requested area of interest, in contrast to the increasing tendency to sub-specializations. Only a few numbers of participants (<1%) expressed their interest in dedicating their future in the research field.
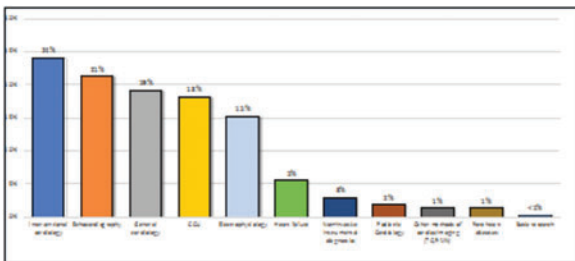
Conclusion: universities and politicians should make a great effort in the organization and re-organization of the teaching programs, taking into account the opinions of the cardiologists of tomorrow.

13 Tele-health monitoring for hypertrophic cardiomyopathy and amyloid cardiomyopathy patients: lessons from the COVID-19 lockdown in Italy

Giacomo Tini[1], Pier Filippo[1], VianelloGinevra Rizzola[1], Giovanni La Malfa[1], Italo Porto[1], and Marco Canepa[1]

[1]Cardiologia, Ospedale Policlinico San Martino IRCCS, Universita' di Genova

Aims: Italy has been profoundly hit by the SARS-COV-2 pandemic. As a result, governative measures were required to slow virus spread, with a lockdown imposed beginning from March to June 2020. Such measures involved also in-hospital outpatient visits, and clinicians were urged to postpone or even halt visits deemed as non-urgent.

Methods and results: At the beginning of COVID-19 lockdown (from March 9th throughout May 15th) the already existing tele-health monitoring programme of the Hypertrophic Cardiomyopathy (HCM) Outpatient Clinic at the Ospedale Policlinico San Martino, in Genova, Italy, was implemented. HCM and cardiac amyloid (CA) patients with a scheduled visit were contacted by a medical trainee to assess urgency related to her/his medical evaluation. According to information collected via the tele-medical contact, patients were divided in 'stable' (group A) and 'potentially unstable' (group B). Patients were deemed as 'potentially unstable' if one or more of the following were present: signs and/or symptoms of heart failure (HF), in particular if worsening relatively to the baseline condition; known end-stage HCM; HF hospitalization(s) or multiple (>3) outpatients evaluations in the prior 6 months. Those in group B received weekly tele-medical contact to monitor their conditions and evaluate the need for in-hospital in-person visits, whereas those in group A were scheduled to be contacted after 1 month. In the observation period, 40 patients (median age: 62 years, 28 HCM and 12 CA patients) received a tele-contact. In 15 cases the tele-medical contact was pursued via email. Nineteen patients were deemed as 'potentially unstable' (10 CA and 9 HCM). The main reason for inclusion in group-B was a recent HF hospitalization. No 'stable' patients sought medical attention outside the planned tele-medical contacts. Eight 'potentially unstable' patients needed unplanned medical attention. In 4 instances, their needs were managed via tele-contact without the need for in-person evaluations: 2 CA patients needed optimization of diuretic therapy; 2 obstructive HCM patients needed optimization of therapy for relief of obstruction. In 3 other instances, a medical outpatient evaluation was required: 2 CA patients presented worsening HF symptoms, and 1 severely obese HCM patient presented a new-onset atrial fibrillation with high ventricular response. Finally, 1 CA patient required hospitalization due to acute decompensated HF.

Conclusion: Tele-health monitoring strategies have never been specifically assessed in cardiomyopathy patients. In our experience, a short-term tele-health monitoring programme was feasible and effective. In current COVID-19 times, tele-medicine served as an emergency tool, yet lessons from its beneficial impact on healthcare practice may be exploited for the future.

22 Prognostic utility of quantitative offline 2D-echocardiography in hospitalized patients with COVID-19 disease

Filippo Toriello[1], Francesca Bursi[1], Gloria Santangelo[1], Dario Sansalone[1], Federica Valli[1], Anna Maria Vella[1], Andrea Barbieri[2], and Stefano Carugo[1]

[1]Division of Cardiology, Heart and Lung Department, San Paolo Hospital, Asst Santi Paolo and Carlo, University of Milan, [2]Division of Cardiology, Department of Diagnostics, Clinical and Public Health Medicine, Policlinico University Hospital of Modena, University of Modena and Reggio Emilia

Aims: To assess the prognostic utility of quantitative 2 D-echocardiography, including strain, in patients with confirmed COVID-19 disease.

Methods and results: COVID-19 patients admitted to the San Paolo University Hospital of Milan, that underwent a clinically indicated echocardiographic exam were included in the study. To limit contamination all measurements were performed offline. Quantitative measurements were obtained by an operator blinded to the clinical data. Among the 49 patients, non-survivors (33%) had worse respiratory parameters, index of multiorgan failure and worse markers of severity of lung involvement. Right Ventricular (RV) dysfunction (as assessed by conventional and 2-dimensional speckle tracking) was a common finding and a powerful independent predictor of mortality. At the ROC curve analyses, RV free-wall longitudinal strain (LS) showed an AUC 0.77 ± 0.08 in predicting death, $p = 0.008$, and global RV LS (RV-GLS) showed an AUC 0.79 ± 0.04, $p = 0.004$. This association remained significant after correction for age (OR = 1.16, 95%CI 1.01-1.34, $p = 0.029$ for RV free-wall LS and OR = 1.20, 95%CI 1.01-1.42, $p = 0.033$ for RV-GLS), for oxygen partial pressure at arterial gas analysis/fraction of inspired oxygen (OR = 1.28, 95%CI 1.04-1.57, $p = 0.021$ for RV free wall-LS and OR = 1.30, 95%CI 1.04-1.62, $p = 0.020$ for RV-GLS) and for the severity of pulmonary involvement measured by a computed tomography lung score (OR = 1.27, 95%CI 1.02-1.19, $p = 0.034$ for RV free-wall LS, and OR = 1.30, 95%CI 1.04-1.63, $p = 0.022$ for RV-GLS).

Conclusion: In patients hospitalized with COVID-19, offline quantitative 2 D-echocardiographic assessment of cardiac function is feasible. Parameters of RV function are frequently abnormal and have an independent prognostic value over markers of severity of pulmonary involvement.