Supplementary file

Supplemental Table S1. Literature Summary Table

Study	Type of Study	Study Population	Aim	Summary Points
Xie[15]	Retrospective study	153760 patients with COVID -19 5637647 contemporary controls 5859411 historical controls	To estimate the risks and 12- month burden of pre-specified incident cardiovascular outcomes	Increased risk of single and composite outcomes in patients with COVID – 19: cerebrovascular disorders arrhythmias; inflammatory heart disease; ischemic heart; other cardiac disorders; thrombotic disorders; MACE (all-cause mortality, stroke and myocardial infarction)
Basso[17]	Retrospective multicenter study	21 cardiac tissues from autopsies of consecutive COVID – 19 patients	To assess the pathological spectrum of cardiac involvement in COVID – 19 To determine the frequency and type of myocarditis and other forms of cardiac injury	Myocarditis: 3 cases Increased interstitial macrophage infiltration in the myocardium: 18 cases Mild pericarditis: 4 cases
Blagova [21]	Retrospective study	14 patients with biopsy proven post- COVID-19 myocarditis	To study the clinical signs and mechanism of myoendocarditis in the long-term period after COVID -19	Increased anti-heart antibodies in 92.9 % of the patients Acute lymphocytic myocarditis – 12 patients Eosinophilic myocarditis – 2 patients Endocarditis – 3 patients
Bauer[26]	Cross-sectional, single-center pilot study	30 healthy male elite athletes	To assess the effect of COVID- 19 on systemic arterial stiffness without impairment of cardiovascular function	Significant vascular alterations: increase in Aix and Aix@75, significant effects of time on peripheral and aortic blood pressure values
Boehmer[33]	Retrospective study	3605294 patients, among whom 1452773 COVID -19 patients	To assess the association between COVID – 19 and myocarditis	The occurrence of myocarditis was 42% higher in 2020 than in 2019 The risk of myocarditis in COVID -19 patients was 16 times higher than in non – COVID -19 patients

				40% of the patients with myocarditis had a history of COVID -19
Ammirati[35]	Retrospective observational multicentric study	112 patients with suspected acute myocarditis	To report the prevalence, baseline characteristics, in -hospital management and outcomes for patients with COVID -19 associated acute myocarditis	Acute myocarditis: 2.4 to 4.1 per 1000 COVID -19 hospitalizations
Vidula[36]	Retrospective multicenter study	1047 patients with COVID -19 who underwent CMR	To characterize myocardial injury in COVID -19 patients	Nonischaemic injury: 20.9% Acute myocarditis: 7.9% Nonacute/nonischaemic: 13%
Daniels[37]	Observational study	1597 US competitive athletes with CMR screening after COVID -19	To determine the prevalence of myocarditis in athletes with COVID -19 and compare screening strategies for safe return to play	Myocarditis: 37 athletes (2.3%) CMR yielded a 7.4 – fold increase in the detection of myocarditis Follow -up CMR: resolution of T2 elevation in all and LGE in 11 athletes
Martinez[38]	Cross – sectional study	789 professional athletes, among whom 460 had COVID -19	To determine the prevalence of abnormal return – to- play test results potentially associated with cardiac injury post – COVID 19 and results of additional testing	Abnormal screening results: 30 athletes CMR: 5 athletes No adverse cardiac events in athletes who resumed sport
Starekova[39]	Retrospective study	145 competitive athletes recovering from COVID – 19 who underwent CMR	To describe the prevalence and severity of CMR findings of myocarditis	CMR findings consistent of myocarditis: 2 patients Marked nonischemic LGE and T2 weighted abnormalities: 1 patient
Rajpal[40]	Prospective study	26 competitive college athletes with COVID- 19 who underwent CMR	To investigate the use of CMR to detect myocardial inflammation and identify high – risk athletes for return to competitive play	CMR findings suggestive of myocarditis: 4 athletes LGE without T2-elevation: 8 athletes

Clark[41]	Retrospective study	59 COVID- 19 positive athletes who underwent cardiovascular screening protocol 60 athletic controls 27 healthy controls	To evaluate the prevalence and extent of cardiovascular pathology in COVID- 19 positive athletes	Myocarditis: 2 COVID -19 positive athletes, among whom 1 developed left ventricle dysfunction Other disparities between athletes and healthy controls may represent only remodeling from athletic training
Artico[42]	Prospective, multicenter, observational study	342 patients with COVID – 19 and elevated troponin level Two control groups : 64 COVID -19 patients with normal troponin levels and 113 patients without COVID -19 or elevated troponin levels	To assess the presence, nature and extend of myocardial damage in COVID -19 hospitalized patients with troponin elevation	The frequency of any heart abnormality (left or right ventricular impairment, scar or pericardial disease): 2-fold greater in cases compared to controls: 61% vs 31 % Cases were more likely than controls to have infarction: 13% vs 2% and 7% Probable recent myocarditis: 6.7% in cases compared to 1.7% in controls without COVID -19
Linschoten[47]	International patient registry	3011 hospitalized COVID -19 patients	To determine the frequency and pattern of cardiac complications in patients hospitalized with COVID -19	In- hospital mortality: 19.8%, among which 2.7% cardiac causes Cardiac complications: 11.6 % patients
Brito[49]	Cross – sectional observational study	54 consecutive student athletes COVID – 19 positive who underwent echocardiography and CMR (48 subjects)	To explore the spectrum of cardiac abnormalities in student athletes with uncomplicated COVID- 19	Pericardial late enhacements and pericardial efussion: 39.5% athletes, among whom 12.5% had reduced GLS and/or increased T1
Puntmann[50]	Prospective observational study	100 patients who recently recovered from COVID -19	To evaluate the presence of myocardial injury in unselected patients recently recovered from COVID -19	Cardiac involvement in 78 patients on CMR Ongoing myocardial inflammation: 60 patients

KT[60]	Prospective multicenter registry	144 STEMI and 121 NSTEMI patients with COVID -19 Controls : national pre- Covid -19 database	To report the demographics, angiographic findings and in- hospital outomes of COVID- 19 ACS patients and compare them with pre- COVID -19 cohorts	Symptom -to – admission times: significantly prolonged in COVID – ACS patients compared to pre – COVID cohorts (STEMI 339 min vs 173 min; NSTEMI 417 min vs 295 min) Mortality in COVID – ACS patients was significantly higher than in pre- COVID cohorts (STEMI 22.9% vs 5.7%, NSTEMI 6.6% vs 1.2%) Cardiogenic shock: 20.1% in COVID – STEMI vs 8.7% in controls
Acharya[61]	Multicenter Registry AHA – COVID -19 CVD	8920 patients hospitalized with COVID -19	To examine the incidence of IHCA in hospitalize patients with COVID 19	IHCA: 5.9% patients – non- shockable rhythm 76.5% Independent predictors of IHCA: older age, Hispanic ethnicity, non – Hispanic black race, oxygen use at admission, quick Sequential Organ Failure Assessment score on admission, hypertension 6.9% patients with IHCA survived to discharge
Sultanian[63]	Observational registry	1946 cases of OHCA and 1080 cases of IHCA beween 1 January to 20 July 2020	To evaluate the characteristics and outcome among cardiac arrest cases with COVID -19 and differences between pre-pandemic and pandemic period in OHCA and IHCA	COVID -19 was in involved in 10% of all OHCAs and 16% of IHCAs In COVID -19 cases, 30 – day mortality was increased 3.4 – fold in OHCA and 2.3 – fold in IHCA
Bilaloglu[65]	Retrospective multicenter study	3334 hospitalized COVID -19 patients	To assess the incidence and risk factors for venous and arterial thrombotic events in patients hospitalized with COVID 19	Any thrombotic event: 16% of patients 6.2% venous, 11.1% arterial All – cause mortality was 24.65% in those with thrombotic events
Cosyns[71]	Retrospective study	117 IE cases	To compare the number of cases of IE between January 24, 2020 and April 30, 2020 with the number of cases of IE during the same time frame in 2019 and the rate of	The percentage of diagnosed IE decreased by 33% during the COVID -19 pandemic

			in – hospital complications and mortality between the 2 periods	Cerebral embolism rate: 18% in 2019 vs 56% in 2020 In – hospital IE mortality: 21% in 2019 vs 61 % in 2020
Bhatla[73]	Retrospective study	700 patients hospitalized with COVID -19	To evaluate the risk of cardiac arrest and arrhythmias in patients hospitalized with COVID -19	Cardiac arrest: 9 patients AF: 25 patients Bradyarrhythmia: 9 patients NSVT: 10 patients Only cardiac arrest was associated with in – hospital mortality
Wollborn[75]	Retrospective study	111 529 patients : 3090 COVID – 19 positive patients matched with 11004 patients COVID – 19 negative and with 5005 pre-pandemic patients	To assess the odds of in – hospital AF in COVID – 19 patients compared to COVID -19 negative patients and pre-pandemic patients	COVID -19 positive patients had 1.19 times higher odds to develop AF compared to COVID – 19 negative patients and 1.57 times higher odds compared to pre-pandemic patients
Rosenblatt[76]	Multicenter Registry AHA – COVID -19 CVD	30 999 patients hospitalized with COVID -19	To evaluate the incidence and outcomes associated with new-onset AF in hospitalized COVID – 19 patients	New – onset AF: 5.4% New – onset AF was associated with higher rates of MACE (23.8% VS 6.5%)
Mercuro[78]	Retrospective, observational study	90 COVID -19 patients receiving hydroxychloroquine	To characterize the risk and degree of QT prolongation in patients with COVID- 19 in association with the use of hydroxychloroquine with or without concomitant azithromycin	Patients receiving hydroxychloroquine were at higher risk of QTc prolongation, concomitant azithromycin was associated with greater changes in QTc
Luchian[81]	Prospective study	310 COVID -19 hospitalized patients	To investigate the presence of subclinical cardiac dysfunction in recovered COVID -19 patients without known cardiopulmonary disease	Persistent dyspnea one- year after COVID- 19 was present in 34.8% of the patients GCW and GWI were echocardiographic parameters independently associated with symptoms
Havervall[84]	Prospective study	2149 health care professionals among whom 393 COVID -19 positive	To investigate COVID -19 – related long – term symptoms in health care professionals	COVID – 19 positive participants vs COVID -19 participants had at least 1 moderate to severe symptom lasting ≥ 2 months (26% vs 9%) and 15% vs 3% had at least 1 moderate to severe symptom lasting ≥ 8 months

Salah[85]	Retrospective study	587330 patients with/without COVID -19/history of HF	To evaluate the association between COVID- 19 recovery and incident HF	COVID -19 hospitalization was associated with a 45% higher hazard of incident HF
Urmeneta Ulloa[86]	Prospective study	57 post- COVID 19 patients and 20 healthy controls who underwent CMR	To detect possible oedema/diffuse fibrosis using CMR	Post -COVID -19 patients compared to healthy controls had raised T2 values but similar native T1, FT- CS and FT – RS were lower in post – COVID -19 patients undergoing CMR after < 8 weeks compared to ≥ 8 weeks
Puntmann[87]	Prospective observational cohort	346 post -COVID – 19 patients who underwent CMR 90 controls without COVID – 19	To assess potential differences in imaging and biomarker parameters between individuals with lingering cardiac symptoms post COVID-19 compared to those without symptoms or controls without previous infection	Symptomatic COVID -19 patients had higher heart rates and higher imaging values or contrast agent accumulation Diffuse myocardial oedema was more significant in patients who remained symptomatic at follow -up
Raisi – Estabragh[88]	Retrospective study – UK Biobank	17 871 COVID 19 cases	To examine the association between COVID- 19 and incident cardiovascular events	Non – hospitalized patients: higher risk of incident VTE and death Primary COVID – 19 hospitalization: increased risk of all outcomes (myocardial infarction, stroke, HF, AF, VTE, pericarditis, all – cause death, cardiovascular death) COVID -19 as secondary hospitalization diagnosis: similarly increased risk of all outcomes
Lau[92]	Prospective cross-sectional study	15 consecutive patients with resting HR ≥ 90 bpm	To identify possible causes for tachycardia in patients recovering from COVID -19	Symptomatology was attributed to deconditioning and anxiety
Huang[94]	Ambidirectional study	1733 discharged COVID -19 patients	To describe the long – term health consequences of patients with COVID -19 and investigate the associated risk factors	6 months post – acute COVID -19 infection, the most common symptoms were fatigue, muscle weakness, sleep difficulties, anxiety or depression

				Patients more severely ill during hospitalization had more severe pulmonary dysfunction and abnormal chest imaging
Kedor[95]	Prospective observational study	42 post- COVID -19 syndrome patients	To analyze clinical and laboratory parameters in patients with post- COVID -19 syndrome with persistent moderate to severe fatigue and exertion intolerance 6 months post- acute infection	Patients with mild- COVID -19 develop a chronic syndrome, hand grip strength was associated with biomarkers which indicate hypoperfusion and inflammation

*superscript: number of reference cited in the manuscript; Abbreviations: ACS = acute coronary syndrome, AF = atrial fibrillation, COVID -19 = coronavirus disease 2019, CMR = cardiac magnetic resonance, FT – CS = feature tracking circumferential strain, FT – RS = feature tracking radial strain, GCW = global constructive work, GWI = global work index, GLS = global longitudinal strain, HF = heart failure, HR = heart rate IE = infective endocarditis, IHCA = in – hospital cardiac arrest, LGE = late gadolinium enhancement, MACE = major adverse cardiovascular events, NSTEMI = non ST- elevation myocardial infarction, NSVT = non – sustained ventricular tachycardia, OHCA = out – of – hospital cardiac arrest, STEMI = ST – elevation myocardial infarction, VTE = venous thromboembolism