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Both typical and atypical radiological changes predict poor COVID-19 outcome in HIV-positive patients from a multinational observational study – data from Euroguidelines in Central and Eastern Europe Network Group

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Background

In countries with limited resources, people living with HIV (PLWH) may differently present lung infections hindering the differential diagnosis and the choice of treatment during coronavirus disease 2019 (COVID-19). This study aims to investigate the association between radiological changes and poor COVID-19 outcome in PLWH from Central and Eastern Europe.

Methods

Since November 2020 Euroguidelines in Central and Eastern Europe Network Group have started collecting data on HIV/COVID-19 co-infection. In total data was submitted from 16 countries (eCRF) on 557 HIV-positive patients. Analysis included patients with radiological examination performed. Logistic regression models were used to identify factors associated with death (**Figure 1**), ICU admission or partial recovery (poor COVID-19 outcome). Factors significant in univariate models ($p<0.1$) were included in multivariate model. **Figure 2, 3** and **4** presents examples of none, typical and atypical radiological changes.

Results

Radiological data were available for 224 (40.2%) patients, 108 (48.2%) had computed tomography and 116 (51.8%) chest X-ray. Of these 211 (94.2%) were diagnosed with RT-PCR, 212 (94.6%) were symptomatic, 123 (55.6%) were hospitalized, 137 (16.6%) required oxygen therapy and 28 (13.1%) either died, was admitted to ICU or only partially recovered. By radiologist's description 138 (61.6%) patients had typical, 18 (8.0%) atypical and 68 (30.4%) no radiological changes. Baseline characteristics are presented in **Table.**

In univariate models, CD4 count (OR=0.86 [95% CI: 0.76–0.98]), having a comorbidity (2.33 [1.43–3.80]), co-infection with HCV and/or HBV (3.17 [1.32–7.60]), being currently employed (0.31 [0.13–0.70]), being on antiretroviral therapy (0.22 [0.08–0.63]), and having typical (3.90 [1.12–13.65]) or atypical (10.8 [2.23–52.5]) radiological changes were significantly associated with poor COVID-19 outcome.

In the multivariate model being on antiretroviral therapy (OR=0.20 [95% CI: 0.05–0.80]) decreased the odds of poor COVID-19 outcome. Having a comorbidity (2.12 [1.20–3.72]), as wells as both typical (4.23 [1.05–17.0]) and atypical (6.39 [1.03–39.7]) radiological changes (vs. no changes) increased the odds of poor COVID-19 outcome.

Conclusions

Among HIV-positive patients diagnosed with symptomatic SARS-CoV-2 infections presence of both typical and atypical radiological COVID-19 changes independently predicted poorer COVID-19 outcome.

Table. Baseline characteristics of HIV-positive patients with COVID-19 regarding presence and type of radiological changes.

		Radiological changes			
Characteristic	**All n=224**	**Typical n=138**	**Atypical n=18**	**None n=68**	**P value**
Age in years, median (IQR)	45 (35.0-55.0)	47.0 (38.5-57.0)	45.5 (38.0-52.0)	40 (34.5-48.5)	0.0080
BMI in kg/m2, median (IQR)	24.6 (21.4-28.7)	24.6 (21.6-29.0)	20.9 (17.8-24.4)	24.0 (21.3-29.0)	0.0044
Female sex, n (%)	77 (34.7)	44 (32.1)	7 (41.2)	26 (38.2)	0.5788
Currently employed, n (%)	133 (59.4)	82 (59.4)	10 (55.6)	41 (55.6)	0.9358
Ever smoking cigarettes, n (%)	136 (60.7)	54 (61.4)	12 (66.7)	40 (58.8)	0.8308
One or more comorbidity, n (%)	83 (37.0)	53 (38.4)	9 (50.0)	21 (30.9)	0.2848
Nr of comorbidities, median (IQR)	0 (0-1)	0 (0-1)	1 (0-1)	0 (0-1)	0.2281
HCV and/or HBV co-infection, n (%)	39 (17.7)	24 (17.5)	8 (44.4)	7 (10.8)	0.0017
MSM mode of HIV infection, n (%)	64 (28.6)	40 (29.0)	5 (27.8)	19 (27.9)	0.1342
Time since HIV diagnosis in years, median (IQR)	9 (5-14)	10 (6-15)	11.5 (1-19)	7 (3-11)	0.0107
CD4 count in cells/ul, median (IQR)	539 (307-818)	545 (370-830)	344 (140-609)	521 (268-833)	0.1017
HIV VL <50 copies/ml, n (%)	174 (77.7)	109 (62.6)	9 (50.0)	56 (82.3)	0.0114
On antiretroviral therapy, n (%)	203 (90.6)	130 (94.2)	13 (72.2)	60 (88.2)	0.0078
InSTI as third drug in cART, n (%)	134 (65.4)	81 (62.3)	11 (73.3)	42 (70.0)	0.2546
TDF or TAF in backbone, n (%)	146 (65.2)	90 (65.2)	13 (72.2)	43 (63.2)	0.7762
Any COVID-19 symptoms , n (%)	212 (94.6)	135 (97.8)	17 (94.4)	60 (88.2)	0.0160
Hospitalized, n (%)	123 (55.6)	88 (63.8)	13 (72.2)	22 (32.8)	<0.0001
Requiring oxygen therapy, n (%)	37 (16.6)	34 (24.6)	3 (16.7)	0 (0.0)	<0.0001
Died, admitted to ICU or no improvement, n(%)	28 (13.1)	20 (15.3)	5 (33.3)	3 (4.4)	0.0054

Figure 1. Results of the logistic regression model where unadjusted and adjusted odds ratios of death are presented for patients with HIV/COVID-19 co-infection.

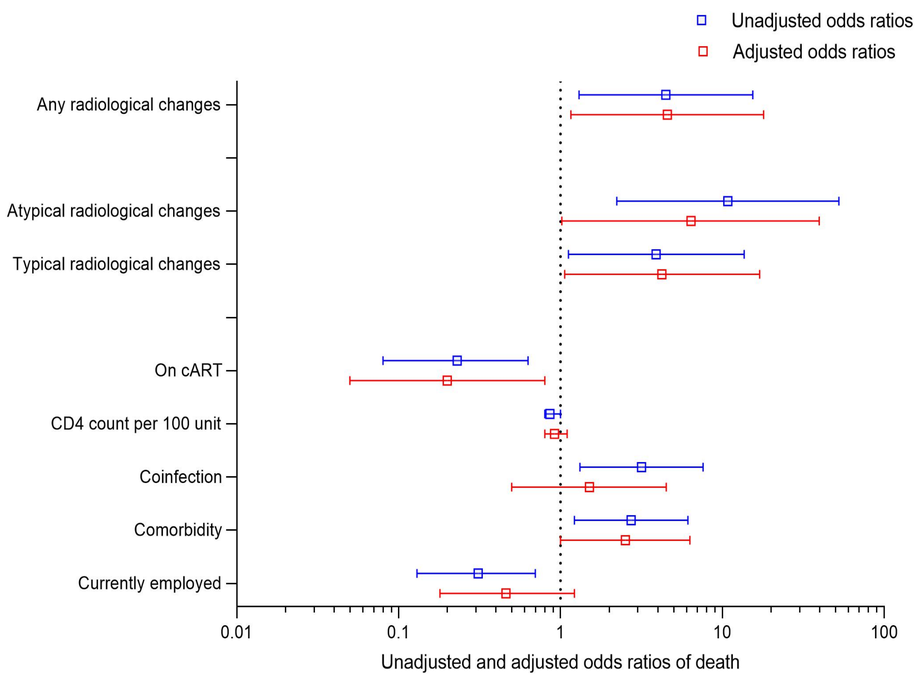
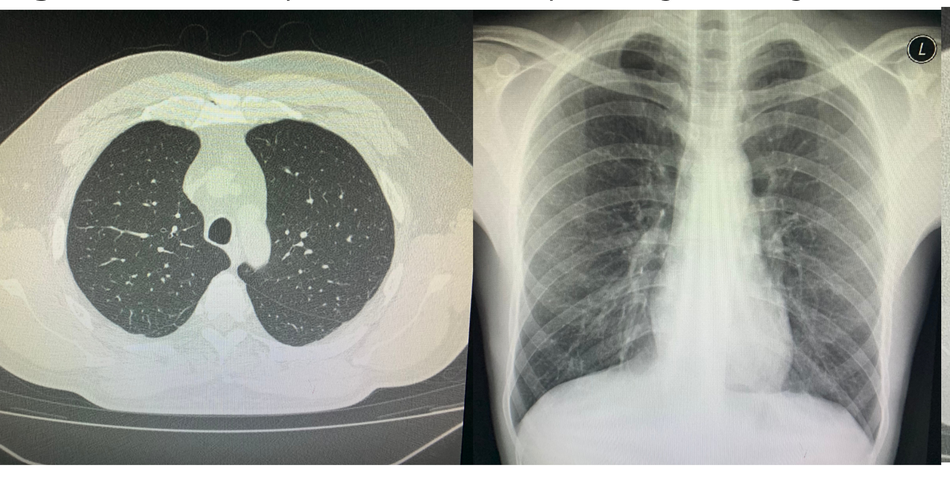
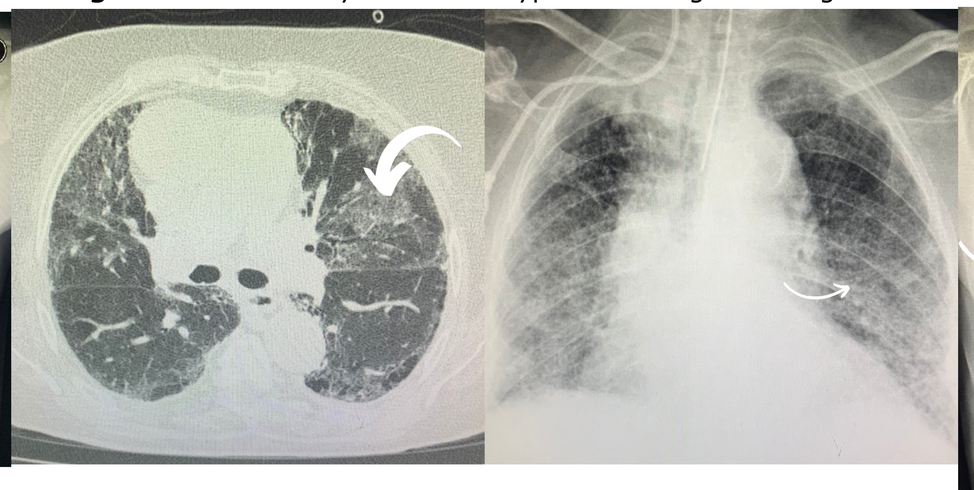


Figure 2. Chest X-ray and CT without any radiological changes

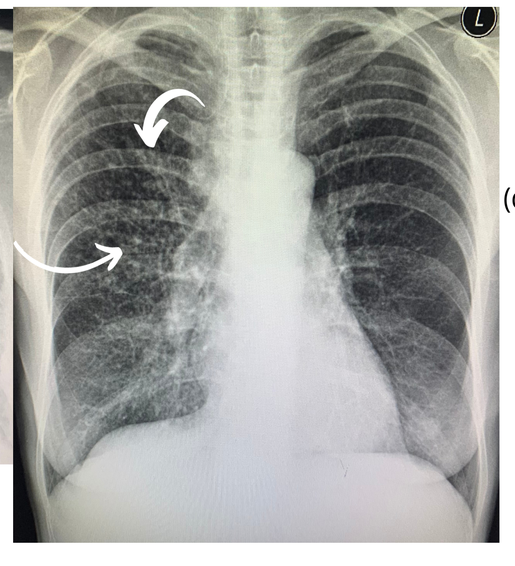


No radiological changes

Figure 3. Chest X-ray and CT of typical radiological changes



Typical radiological changes (bilateral and peripheral ground glass and consolidated opacities)



Atypical radiological changes (diffuse nodular changes)

Figure 4. Chest X-ray of atypical radiological changes

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