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Common Lung Ultrasound Patterns in COVID-19: Correlation With Vital Signs and Inflammatory Biomarkers

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Study Objectives: Subpleural consolidations and B-lines are common lung ultrasound (LUS) patterns seen in patients infected with COVID-19. The aim of this study is to describe how each LUS pattern correlates with patient vital signs and inflammatory biomarkers.

Methods: This is a retrospective analysis of adult patients who presented to a large urban tertiary emergency department between May 1, 2020 and June 30, 2020. Patients were included in the study if they presented with a respiratory chief complaint; 2) met systemic inflammatory response syndrome (SIRS) criteria; 3) were confirmed to have COVID-19 diagnosed by PCR; and 4) had point-of-care LUS performed and recorded in our imaging storage database. All clinical data was reviewed using the hospital’s electronic medical records. The study was approved through the Institutional Review Board (IRB). All LUS images were obtained by emergency medicine physicians during the patient’s emergency department course and were considered adequate if they included a minimum of 4 lung fields (bilateral anterior and posterior fields). Images were assessed for subpleural consolidations, B-lines, and merging B-lines. LUS patterns were measured against patient vital signs (temperature, heart rate, respiratory rate, SpO2) and inflammatory biomarkers (CRP, D-Dimer, Ferritin, LDH, Procalcitonin) that were collected on initial hospital presentation. Linear correlations were performed using Pearson’s coefficient. Statistical analysis was completed with SPSS. Statistical significance was set at p < 0.05.

Results: A total of 39 patients were included in the study. There were 33 men and 6 women ranging in age between 23 and 77 years old with a mean age of 49 years. Conclusions: Subpleural consolidations were found to have a positive correlation with increasing respiratory rate (p=0.046) and ferritin levels (p=0.0016). An increasing percentage of intercostal spaces with B-lines and confluent B-lines had a positive correlation with ferritin levels (SpO2 (p=0.0021):016, 0.034). LUS did not correlate with inflammatory biomarkers.

Lastly, merging B-lines were found to have a positive correlation with D-Dimer (p=0.015) and ferritin levels (p=0.0015). Subpleural consolidations, B-lines, and mergingconfluent B-lines appear to correlate with elevated ferritin, a marker that has been associated with severe COVID-19 disease. Additionally, subpleural consolidations were found to correlate with worse clinical and respiratory status. These LUS patterns may be manifestations of more severe lung injury and systemic pathophysiological processes that take place over the course of a COVID-19 infection, specifically SpO2. However, further surprising these common LUS findings did not correlate with inflammatory lab values, which some studies suggest may have prognostic value for patients with COVID.

Our study has limitations. This study specifically was limited to only patient’s that had a recorded LUS image in our storage database. Therefore, many patients with covid may have been excluded.

Our study highlights that there is a potential role for US in the assessment of disease severity. Further investigation is needed to determine prognostication of these LUS patterns.

Impact of the COVID-19 Pandemic on Workplace Violence at an Academic Emergency Department

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Study Objectives: Violence in the emergency department (ED) is a common and longstanding threat to staff. The COVID-19 pandemic brought unique challenges; however, it remains unclear what effect the pandemic had on violence in healthcare. The objective of this study was to identify the impact of the pandemic on workplace violence at an academic emergency department in the Midwest.

Methods: The hospital referral region (HRR) COVID-19 case rate per 100,000 people was obtained from March through December 2020. Monthly incidents of ED violence were obtained from the Office of Security and included both physical assault and verbal threats where security officers were notified to respond. These incidents were combined with monthly reports of violent flags added to patient charts within the electronic medical record. Overlapping data from both sources were counted only once. Monthly ED patient volume was obtained to calculate a rate of violent incidents per 1,000 ED visits. Two anonymous surveys were sent to all multidisciplinary ED staff both pre/early-pandemic (April 2020) and mid/late-pandemic (December 2020) and surveyed respondents regarding the incidence of verbal abuse and physical assault experienced over the prior 6-months (November 2019-April 2020 and July 2020-December 2020). Chi-squared tests and Fisher’s exact tests were used for comparison. The study was deemed exempt by the Mayo Clinic Institutional Review Board.

Results: There was a positive association between the HRR rate and rate of violent ED incidents (r = 0.24; Figure 1). There was also an increase in overall violent workplace incidents per ED volume during the pandemic compared to the months leading up to it. A total of 259 responses were received for the initial pre/early-pandemic survey and 259 responses received for the mid/late-pandemic survey. The reported level of safety perceived by staff remained the same, as did the overall percentage of respondents indicating any verbal abuse or physical assault in the prior 6-months. The frequency of verbal abuse experienced by staff did increase during the pandemic, with 6.2% of respondents pre/early-pandemic indicating verbal abuse by patients or their visitors every day or two, compared to 10.8% mid/late-pandemic (p = .029).

Conclusion: Despite our findings of a positive association between the COVID-19 case rate and rate of violent ED incidents, the percentage of our survey respondents indicating verbal abuse or physical assault experienced in a 6-month time period remained unchanged between the pre/early-pandemic and mid/late-pandemic periods, as did staff perception of workplace safety. This difference in documented and self-