

Pneumomediastinum, Pneumothorax, Pneumoperitoneum Reflects Parenchymal Damage or a Consequence of Ventilatory Support in Patients with Severe Covid19

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INTRODUCTION

Pneumomediastinum is the presence of air in the mediastinum, located around the heart, and structures in the middle of the thorax, while pneumothorax is the presence of air in the pleural space and pneumoperitoneum is nothing more than air in the peritoneum, these spaces in conditions normal does not contain the presence of air, so its existence should alert the clinician to an abnormality, some of the structures present in these compartments may be affected, in this context, these three entities are closely related to open or closed thoracic or abdominal trauma, break of viscera hollow, esophageal perforation, asthmatic patients with severe crisis, or with COPD due to bull rupture, some athletes with extreme efforts such as lifting weights, others as maneuver valsalva, labor etc. Endometriosis and alpha 1 deficiency antitrypsin Or as a consequence of barotrauma due to invasive or non-invasive mechanical ventilation. In patients with severe covid 19 it seems to be a marker of severe pneumonitis since some studies have reported pneumomediastinum in patients who were not receiving mechanical ventilation at the time of diagnosis, in a study multicenter 377 cases half of the patients with Pneumomediastinum. In this study, 377 cases of 58,484 hospitalized patients with Covid-19 were identified, in 53 hospitals in the United Kingdom, reporting an incidence of 0.64% of these 195/377 deaths (57.7%). Pneumomediastinum was associated with high rates of mechanical ventilation 172/377 (45.6%), mechanical ventilation was the most important predictor at the time of diagnosis ($p < 0.001$), along with age ($p < 0.01$) and age. diabetes ($p = 0.08$). (2) Infrequent complications related to Covid-19 have been described, such as pneumopericardium, this is defined as the presence of air in the pericardial space. Generally, the most frequent cause is iatrogenesis due to procedures and open or closed chest trauma, its pathophysiology is closely related to Pneumomediastinum, pneumothorax and subcutaneous emphysema, 3 basic mechanisms are needed, such as: increased pressure between the alveoli and the perivascular interstitial space, loss of integrity of the alveolar wall (alveolar damage and air entry

doors, all this entails that the alveolar air leak, dissects the perivascular interstitial space and travels centripetally towards the mediastinum (in the first place) and from here it can continue to other spaces such as the pericardial space, pleural space or subcutaneous tissue, the examination by Excellence for the diagnosis of pneumopericardium and differentiating it from Pneumomediastinum is computed tomography, this also allows confirming other complications such as pneumothorax and subcutaneous emphysema(1) Below we present a retrospective observational study, in which 400 chest CT scans of patients admitted with a diagnosis of severe covid-19 were reviewed and analyzed in a covid-19 sentinel hospital, Coro, Falcón, Venezuela. The objective was to determine the incidence of Pneumomediastinum, pneumothorax and pneumoperitoneum in patients admitted with severe covid-19, evaluate their signs and symptoms, comorbidities, periods of hospital stay, mortality. The investigation is justified since many of the admitted patients came with deteriorating respiratory status, which was generally attributed to lung parenchymal damage, and the diagnosis of these entities could go unnoticed with fatal consequences for the survival of patients.

MATERIAL AND METHOD

400 CT scans (by an expert pulmonologist) were analyzed, of which those showing the presence of pneumomediastinum, pneumothorax or pneumoperitoneum (60 CT scans) were selected. The clinical history of these patients was reviewed taking into account the following aspects: sex, age, start date of symptoms, date of admission to the hospital, physical examination, pronation, use of invasive mechanical ventilation, lung parenchymal involvement, days of hospitalization, survival or death.

RESULTS

The incidence of Pneumomediastinum was 15%, the clinical and semiological diagnosis was corroborating in the tomography 60%, 40% the diagnosis was late, 73.33% men, 26.66% women, age 40-55 years, 100% consulted between

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10-15 days after the onset of symptoms, 80% reported chest pain retrosternal, irradiated to the neck and interscapular region, 52% presented subcutaneous emphysema, 100% did not tolerate pronation, 10 (16.66%) patients with pneumothorax, 6 hypertensive pneumothorax they merited drains, 9 patients with pneumothorax died, 4 marginal pneumothoraces managed conservatively, 52% patients presented associated pneumomediastinum and pneumopericardium, 4 with pneumoperitoneum of this only 2 were under IMV (4 died), 66.66% of the patients had no comorbidity, 33.33% of the patients had comorbid diabetes, 16% arterial hypertension 10%, obese 7%, history of mycosis 4.12%, asthma and COPD 5% tuberculosis 1.21%, in case of Pneumomediastinum the management was conservative with rest, oxygen, analgesic, antiviral, in case of hypertensive pneumothorax thoracic drainage, 33.33% survived, 66.66% died, the period of hospital stay was 21-60 days. 100% showed severe involvement of the lung parenchyma in the tomography chest.

DISCUSSION

In the casuistry of this retrospective study, it is very important to highlight that to be a single care center for severe patients, the incidence of these entities represented 15% predominantly Pneumomediastinum associated with

pneumopericardium 52%, a condition that is related to comorbidity and severity of parenchymal involvement may be a marker of mortality in these patients. The fact that some had a late diagnosis was due to several factors: they consulted belatedly, others underwent tomography when their respiratory conditions allowed them to be transferred to the radiology service, it was very useful in the diagnosis the clinical and semiological evaluation of the patient who showed subcutaneous emphysema 52% of the patients, of different distribution thorax, neck, face, upper limbs and abdomen, testicles, likewise they did not tolerate being prone, mortality 66.66% more in comorbid patients, with late diagnosis, and when pneumopericardial pneumomediastinum and hypertensive pneumothorax were associated (they died despite chest drainage). Regarding the use of invasive ventilation, only 2 patients in the sample were ventilated and showed pneumoperitoneum, the other 2 with pneumoperitoneum died before receiving IMV

CONCLUSION

Pneumomediastinum, pneumothorax and pneumoperitoneum are markers of severity in severe covid 19, with bilateral lung parenchymal damage, regardless of the existence or not of comorbidity, age and/or invasive or non-invasive ventilatory support.

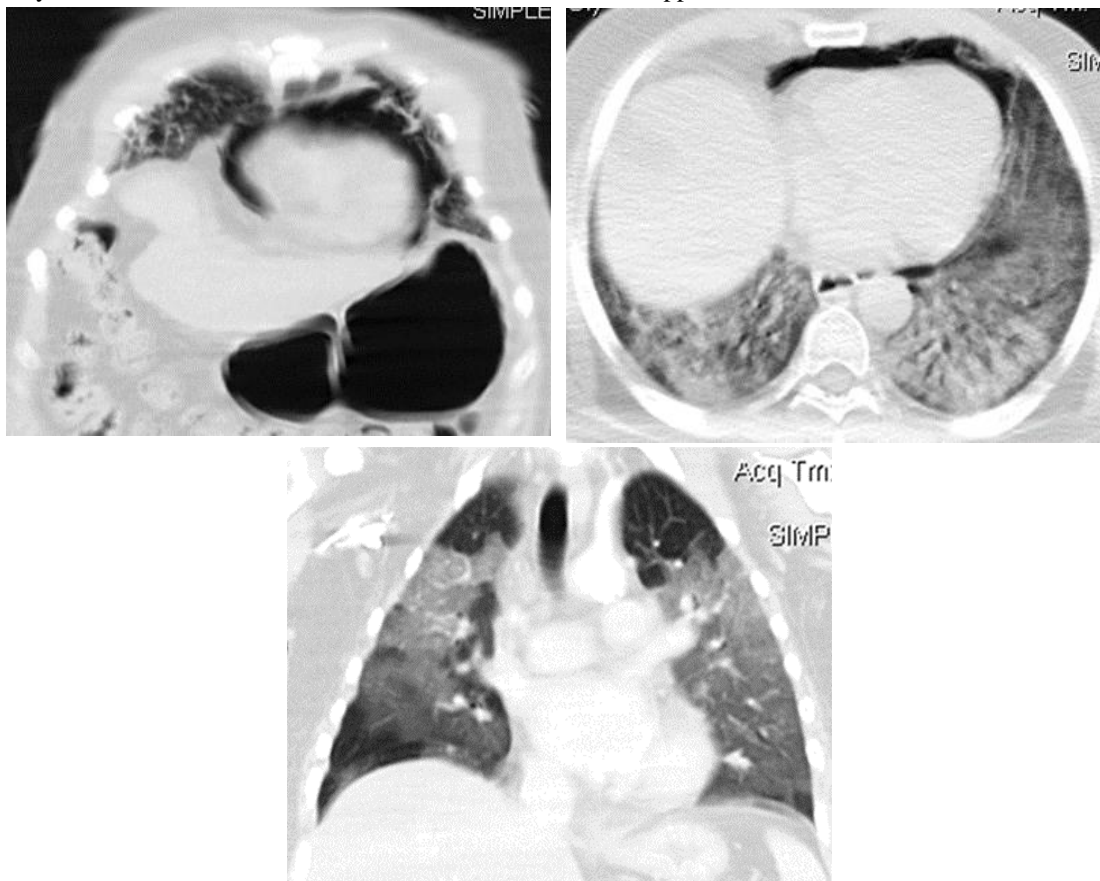


FIG 3. coronal reconstruction (a), axial section of the lung window shows large amounts of pneumopericardium in a male patient with severe covid19 who died after starting NIMV (images from the author's file, Coro Falcón University Hospital, Venezuela 2021)

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