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Research Article

Factors Associated with Presence of Pneumomediastinum and Pneumothorax in Patients with covid 19 in Public Hospital in Puebla

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Abstract

Introduction: Acute respiratory distress syndrome secondary to COVID 19 can lead to the presence of pneumothorax and pneumomediastinum; rare but potentially fatal and is related to mechanical ventilation or the severity of the disease. Recently, cases of pneumomediastinum have been documented despite the use of different protective ventilation measures, without being clear about its origin or prognosis.

Material and Methods: Descriptive, retrospective and single-center study in patients with COVID 19 admitted to a second level hospital in the City of Puebla during March 1, 2020 to March 1, 2021.

Results: During the period from January 2020 to January 2021, 966 patients were admitted to hospital with a diagnosis of COVID 19. 29 (3%) patients presented some pleural complication. 23 (84%) had pneumomediastinum and 5 (18%) had pneumothorax. The most prevalent comorbidities were diabetes, arterial hypertension and obesity. 80% of the patients had dyspnea and chest pain as the initial symptom. In laboratory tests, 80% of the patients had high LDH and C-reactive protein associated with leukocytosis.

Conclusion: The prevalence of pneumothorax and pneumomediastinum in patients with COVID 19 was 3% with a mortality rate of 25%.

Keywords: Pneumomediastinum, Pneumothorax, Prevalence, Factors, COVID 19

Introduction

Currently, coronavirus disease 2019 is a public health problem that has caused millions of deaths worldwide. Acute respiratory distress syndrome secondary to this viral infection can lead to a series of complications such as pneumomediastinum; this is rare but potentially fatal and is related to mechanical ventilation or the severity of the disease [1-5]. Recently, cases of pneumomediastinum have been documented despite the use of different protective ventilation measures, without being clear about its origin or prognosis. Studies have shown that the viral entry of COVID 19 through the angioreceptor of the tensin converting enzyme 2 (ACE2), could lead to a deregulation of surfactant production that contributes to the development of pneumomediastinum due to the alteration of lung compliance [6-10]. Similarly, the upregulation of ACE 2 expression found in chronic hypertension and diabetes could explain that these are the most common comorbidities in the affected population. Initially, it was suspected that it was caused by the presence of invasive mechanical ventilation, however, various studies have been developed in which it is shown that barotrauma alone cannot explain this association, because it has occurred in patients who did not require invasive mechanical ventilation [11-24].

Anthony W. Martinelli *et al*, present a series of cases, evaluated retrospectively. Demographic, radiological, laboratory, clinical management and survival data were evaluated. As results, they obtained that out of a total of 71 patients from 16 centers, 60 patients presented pneumothorax, six of them also developed pneumomediastinum, while 11 patients only had pneumomediastinum. Two patients had two different episodes of progressive bilateral pneumothorax, which was included in the total number of cases with pneumothorax. Therefore, as conclusions, a higher incidence in men was documented, lower survival in patients >70 years and, most relevantly, in their study it did not seem to be a worse prognosis data [7]. Manna *et al*. reported 11 patients of whom presentation characteristics and hospital evolution were described. The 11 patients developed subcutaneous emphysema and pneumomediastinum in the absence of previous mechanical ventilation. Of the total number of patients, eight were men and three were women, the median age was 61 years (range: 38-89 years). The body mass index was 25.9 [5]. Aaron Kangas-Dick *et al*. did a retrospective analysis of 36 patients. Of the total of 36 patients with COVID 19, 34 (10%) had signs of pneumomediastinum. They found that the incidence of pneumomediastinum increased during the first 4 weeks of the pandemic and then began to decrease in the fifth week. The most prevalent comorbidities were diabetes mellitus (55.56%), systemic arterial hypertension (41.67%) and hyperlipidemia (41.67%). Seven patients had asthma or chronic obstructive pulmonary disease (19.44%) and five patients (13.89%) had previous coronary artery disease. In seven patients (19.44%) no medical comorbidities were found [8].

Material and Methods

Retrospective, descriptive, single-center study. Inclusion of patients who during the period January 1st 2020 to January 1st 2021 in a Hospital in Puebla city. Present patients who presented pneumomediastinum and pneumothorax, as well as their clinical characteristics. Patient data were obtained from the medical history. Age, sex, weight, comorbidities, and CT imaging were recorded. Statistical analysis was performed using SPSS version 29.

Results

During the period from January 2020 to January 2021, 966 patients were admitted to hospital with a diagnosis of COVID-19. 29 (3%) patients presented some pleural alteration: 23 patients (80%) presented pneumomediastinum and 7 (20%) presented pneumothorax. The average age was 48.8 years. 22 (75%) men and 7 (25%) women. According to the days of hospitalization, the majority of patients presented on the 10th day of hospitalization. 100% of the patients presented obesity. 50% of the patients presented diabetes and hypertension as comorbidities. 80% of the patients presented dyspnea and chest pain as initial symptoms. In laboratory tests, 80% of the patients presented DHL upper limit.

Discussion

During the pandemic period, different outcomes were presented in patients with severe pneumonia. It is important to highlight that the presence of pneumothorax and pneumomediastinum per se increased mortality by more than 50%. The description of these cases has already been reported in the world literature due to their high mortality. The description of the findings of the research work reports only a prevalence of 3% in a total of 966 patients admitted during a period of 365 days during the pandemic. It is clear to note that only 7% of patients with pleural pathology had a fatal outcome, the other patients improved with the use of oxygen therapy and perhaps detected early as well as with adequate treatment and surveillance. It is clear to describe the comorbidities of the patients that have been the main ones that increase morbidity and mortality, such as diabetes, hypertension, and obesity. Among the most relevant symptoms, it is highlighted that all patients presented some type of cardinal symptoms from fever to muscle pain that in the short term was determined as the presence of pneumothorax or pneumomediastinum.

Conclusion

The prevalence of the presence of pneumothorax or pneumomediastinum is that reported in the world literature (3%) and the risk factors for presenting this outcome are described based on initial and laboratory symptoms that must be taken into account in the evolution of a patient with moderate to severe COVID-19 pneumonia. We conclude that this pleural condition could be attributed to a greater susceptibility in those patients who present a comorbidity associated with the injury caused by the virus (Table 1).

Table 1:

CHARACTERISTIC	PATIENTS N:966
WITHOUT PLEURAL PATHOLOGY	937 (77%)
WITH PLEURAL PATHOLOGY	29 (3%)
AGE	20-95 (48)
GENDER	
MEN	22 (75%)
WOMEN	7 (25%)
PNEUMOTHORAX	23 (80%)
PNEUMOMEDIASTINUM	6 (20%)
COMORBIDITIES	
DIABETES MELLITUS	12 (42%)
ARTERIAL HYPERTENSION	10 (35%)
OBESITY	28 (97%)
SYMPTOMS	
DYSPNEA	26 (90%)
CHEST PAIN	14 (49%)
COUGH	23 (80%)
MUSCLE PAIN	28 (97%)
FEVER	21 (73%)
LABORATORIES	
DHL	24 (83%)
LEUKOCYTOSIS	19 (66%)
ELEVATED C-REACTIVE PROTEIN	29 (100%)
OXYGEN THERAPY	

LOW DOSES (NASAL TIPS)	22 (76%)
HIGH DOSES (HIGH FLOW)	2 (7%)
MECHANICAL VENTILATION	5 (8%)
MORTALITY	7 (25%)

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