Surviving Acute Respiratory Distress Syndrome – a case report

Ivan Šitum[*1], Loredana Divjak[1], Ivona Hanžek[1], Karolina Režek[1],Tina Tomić Mahečić[1], Robert Baronica[1], Anja Mandarić[1], Zrinka Orešković[1], Sandra Morović[2]

[1] University Hospital Centre Zagreb, Department of Anesthesiology, ICU and Pain Therapy, Zagreb, Croatia
[2] Arsano Medical Group

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Correspondence:
Ivan Šitum
ivsitum@gmail.com

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Abstract
In 2023, significant advancements in mechanical ventilation were highlighted due to the end of the COVID pandemic and new ARDS definitions and guidelines. This case report discusses the treatment of a 62-year-old patient with hepatocellular carcinoma undergoing immunotherapy, who developed severe ARDS post-operatively. The report outlines the diagnostic challenges, the use of lung mechanics assessments, and the management strategies including high PEEP ventilation, recruitment maneuvers, and hemoperfusion. The patient's condition improved after aggressive and multifaceted management, emphasizing the importance of early ARDS identification and evidence-based approaches. The report concludes with the patient's recovery and the need for further study on ARDS phenotypes .

Keywords: Acute Respiratory Distress Syndrome (ARDS); Mechanical Ventilation; Lung Mechanics Assessment; High PEEP Ventilation; Hepatocellular Carcinoma

Sažetak:
Preživljenje akutnoga respiratornog distres sindroma -prikaz slučaja
U 2023. istaknut je značajan napredak u mehaničkoj ventilaciji zbog kraja pandemije COVID-a i novih definicija i smjernica ARDS-a. Ovaj prikaz slučaja govori o liječenju 62-godišnjeg pacijenta s hepatocelularnim karcinomom koji je podvrgnut imunoterapiji, a koji je razvio teški ARDS nakon operacije. Prikaz slučaja opisuje dijagnostičke izazove, korištenje procjena mehanike pluća i strategije upravljanja uključujući ventilaciju s visokim PEEP-om, manevre regrutiranja i hemoperfuziju. Stanje bolesnika poboljšalo se nakon aktivnog i agresivnog pristupa liječenju, naglašavajući važnost rane identifikacije ARDS-a i pristupa utemeljenih na dokazima. Prikaz slučaja zaključuje se oporavkom pacijenta i potrebom za daljnjim proučavanjem fenotipova ARDS-a.

Ključne riječi: Sindrom akutnog respiratornog distresa (ARDS); Mehanička ventilacija; Procjena mehanike pluća; Visoki PEEP ventilacija; Hepatocelularni karcinom

Introduction

The year 2023 is highly significant for the field of mechanical ventilation. It marks the end of the COVID pandemic (1) which has highlighted the need for education in mechanical ventilation. Moreover, it is also the year when a new definition for ARDS was introduced (2), as well as the year when new guidelines were published for treating patients with ARDS (3). ARDS is still a very heterogeneous disease with several etiological causes and multiple clinical faces. Despite the general understanding of definitions and symptoms, it is often diagnosed late or misdiagnosed. This lack of clear parameters contributes to the problem, so that we are usually left with the Horowitz index as the only mathematical indicator for ARDS diagnosis, which can confuse us(4).

Case Report

In this paper, we aim to present the case of a 62-year-old patient who is undergoing immunotherapy for hepatocellular carcinoma (BCLC C Vp3) in our Intensive Care Unit. Two days prior to admission, the patient came to the hospital due to redness of the lower leg and was admitted for observation. An operative procedure for abscess drainage was planned. Postoperatively, the patient developed an oxygen requirement via a mask, thus he was transferred to ICU in acute respiratory failure and hypotension picture within 48 hours of surgery. On arrival, he was promptly intubated and mechanically ventilated. Less than 24 hours after hospitalization, a chest ultrasound showed bilateral infiltrates, with a Horowitz index of 56 mmHg; in addition, cellulitis and sepsis were reported in the past medical history along with an abrupt onset of respiratory failure leading to the diagnosis of severe ARDS. A diagnostic assessment of lung mechanics using P/V loop helped initiate a recruitment maneuver for approximately 35 seconds with a pause of 10 seconds at the maximum pressure level followed by mechanical ventilation supported by 15 PEEP. The high levels of acute-phase proteins and inflammatory markers suggested that hyperinflammatory ARDS type further substantiating the need for recruitment and higher PEEP ventilation strategies. In addition to antibiotic treatment, hemoperfusion with the Seraph filter for 8 hours followed by the Oxiris filter for a total of 3 days was also included in therapy. We can divide his stay into three phases (figure 1). During the first acute phase which lasted for 3 days, the patient was placed in the prone position, sedated and relaxed, mechanically ventilated due to marked respiratory drive and on high doses of vasopressor

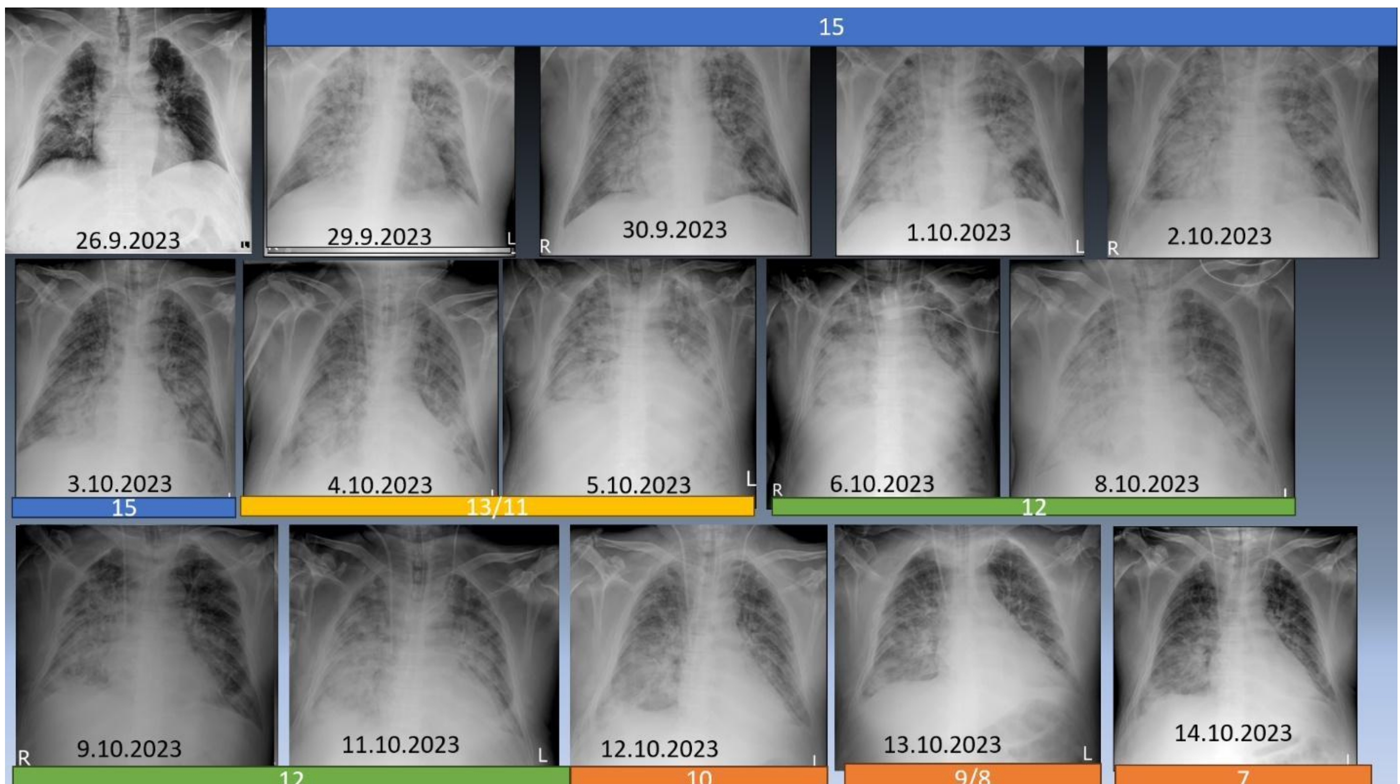

Figure 1. showing PEEP levels peep level during the stay on mechanical ventilation

support. After an initially tumultuous day, there was resolution with normalization of paO2 and paCO2 values as well as pH. On the third day, there is stabilization in the patient's condition and so he or she is changed over to spontaneous ventilation on high PEEP but decreasing gradually FiO2. Initially, it was passive mode followed by active mode of treatment and in the later part of the illness patient is in contact with and actively carries out physiotherapy. After 12 days, move to stage three of recovery where respiratory support is being withdrawn slowly; a low FiO2 with controlled monitor on their respiration parameter, SpO2 as well as patient comfort level would indicate how much we can reduce PEEP. On the 16th day of the patient's stay, he is switched to nasal high-flow cannula support, which is gradually weaned off over the next few days. On the 19th day, the patient is discharged from the ICU and transferred to a ward for further follow-up with the hematologist for treatment of underlying diseases. Informed consent was obtained from the patient for all the diagnostic procedures and treatment interventions detailed in this report.

Discussion

This case report highlights the significance of early identification of ARDS, its management through comprehensive and multifaceted approaches, as well as the adoption of evidence-based medicine. The findings indicate the necessity for further investigations into individual phenotypes of ARDS on their own grounds as this is a diverse syndrome. It highlights the use of lung mechanics assessments and advanced ventilation strategies in managing severe ARDS. Furthermore, it demonstrates the challenges in diagnosing ARDS and the potential impact of timely and multifaceted treatment approaches .

Conclusion

The patient's recovery emphasizes the necessity of early detection and aggressive treatment in ARDS management. This case also calls for further research into the phenotypes of ARDS to enhance understanding and treatment of this diverse syndrome. The findings advocate for continued advancements in ARDS management and a need for ongoing education in mechanical ventilation techniques post-COVID pandemic .

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