

ADVANCED DIAGNOSTIC APPROACHES: THE EFFICACY OF POINT-OF-CARE ULTRASOUND IN MANAGING BILATERAL PNEUMOTHORAX DUE TO BLUNT CHEST TRAUMA



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Introduction

Chest trauma is a major concern in emergency care, ranking as the third leading cause of death after head and abdominal injuries. Bilateral pneumothorax, a life-threatening condition, requires prompt diagnosis to prevent respiratory failure.

Point-of-care ultrasound (POCUS) is invaluable for rapidly assessing thoracic injuries. Its high specificity (94%) and sensitivity (86%), accuracy, portability, and bedside usability significantly enhance its efficacy in emergency settings.

Case Description

A 22-year-old gentleman with no comorbidities sustained blunt chest trauma when a ten kilogram cement block fell onto his chest, causing him to fall backward.

He presented with anterior chest pain, mild shortness of breath, with otherwise normal vital signs. Physical examination revealed chest tenderness and reduced breath sounds bilaterally, with no chest deformity, open wounds, or tracheal deviation.

Immediate lung POCUS showed absent lung sliding signs; presence of "barcode sign" and lung point bilaterally, confirming bilateral pneumothorax. A chest x-ray (CXR) revealed bilateral first rib fractures.

The patient received supplemental high-flow oxygen, and bilateral chest tubes were inserted, after which he was referred to the surgical team and was discharged well after five days.

Discussion

Traumatic pneumothorax is a leading cause of preventable morbidity and mortality, occurring in 20% of blunt and 40% of penetrating chest injuries. POCUS is well-established for its rapid and reliable diagnosis, with studies concluding higher sensitivity (86%-98%) and specificity (94%-100%) compared to CXR. The lung point sign is pathognomonic for pneumothorax, while the absence of lung sliding and comet tail artifacts (B-lines) has a high negative predictive value (98%-100%). While computed tomography (CT) scan remains the gold standard, it requires patient transport, risking hemodynamic stability and delaying treatment.

However, POCUS has challenges, including operator dependency and variability in diagnostic accuracy. Image quality may be compromised in obese patients or those with subcutaneous emphysema. Additionally, POCUS may miss small pneumothoraces and can struggle to differentiate pneumothorax from conditions like bullae, highlighting the need for comprehensive imaging.

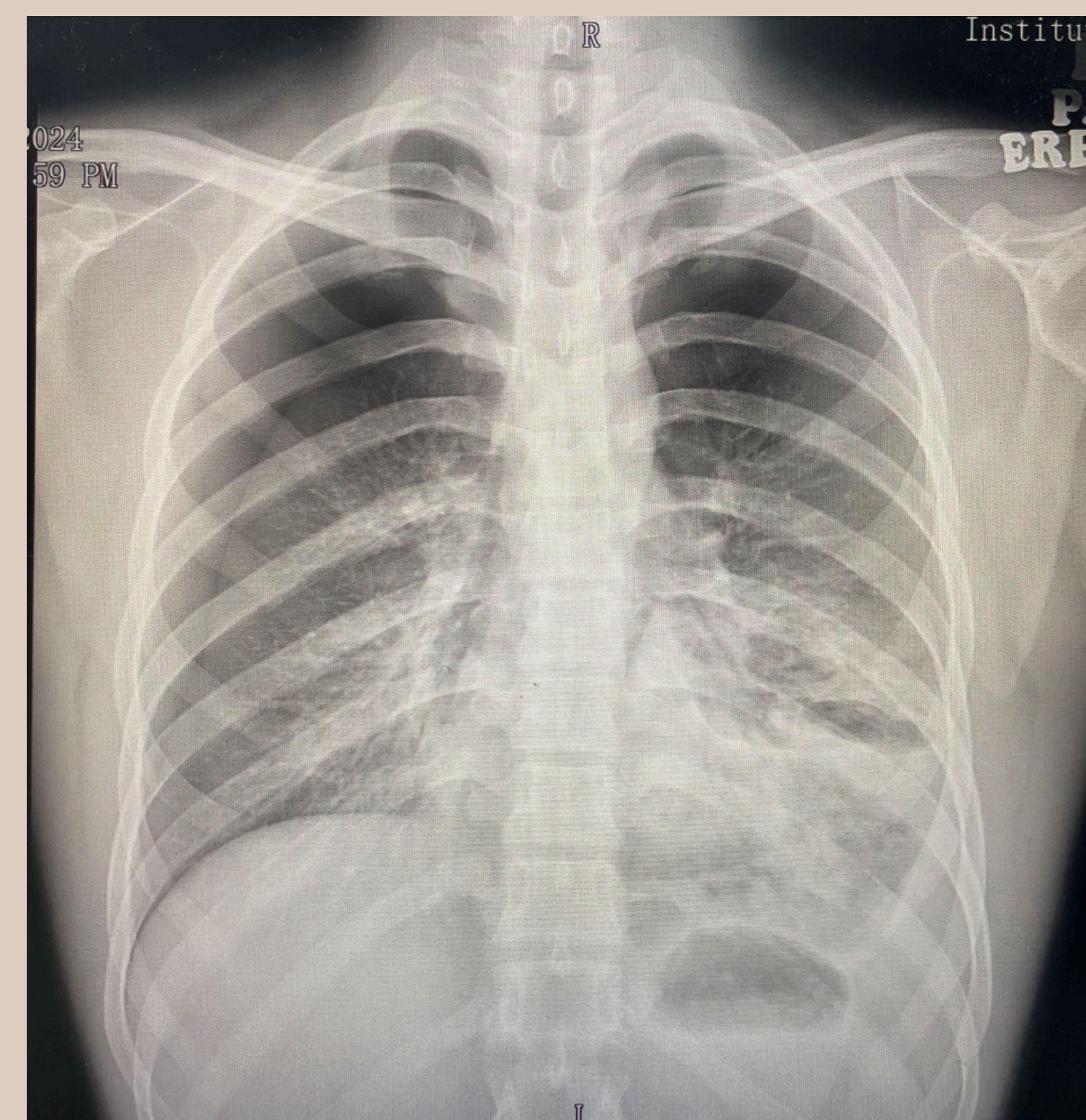


Figure 1 : Bilateral
Pneumothorax in CXR

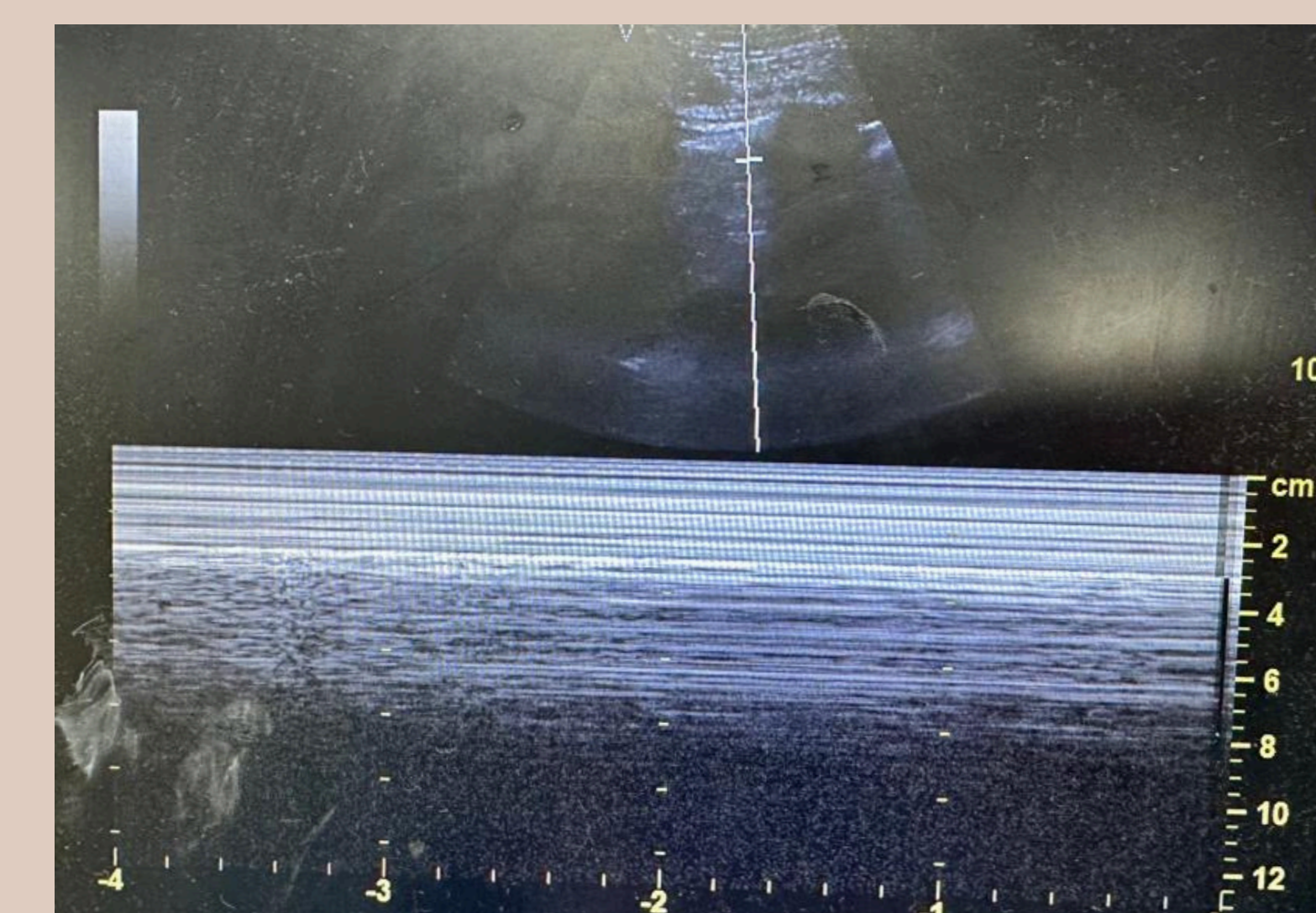


Figure 2 :Sliding sign in POCUS

Conclusion

POCUS is a well-established, portable modality that enables rapid diagnosis of pneumothorax in emergency settings. Despite its limitations, its sensitivity and specificity, driven by specific diagnostic signs, are comparable to that of CT scans, making it an essential tool in the early management of chest trauma.

Reference

- Husain, L. F., Hagopian, L., Wayman, D., Baker, W. E., & Carmody, K. A. (2012). Sonographic diagnosis of pneumothorax. *Journal of Emergencies Trauma and Shock*, 5(1), 76. <https://doi.org/10.4103/0974-2700.93116>
- Bhoil, R., Ahluwalia, A., Chopra, R., Surya, M., & Bhoil, S. (2021). Signs and lines in lung ultrasound. *Journal of Ultrasonography*, 21(86), e225–e233. <https://doi.org/10.15557/jou.2021.0036>