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Abstract

Introduction: Lung herniations are rare defects in the chest wall that require detection to prevent unwanted complications. This case describes a chronic asymptomatic lung herniation that worsened due to a hospital stay for unrelated causes. The herniation developed at the site of her subcutaneous Automatic Implantable Cardioverter and Defibrillator (AICD) biventricular leads entry into the thoracic cavity.

Case Presentation: An 83-year-old female was admitted for an acute T5 compression fracture following a ground-level mechanical fall. Her history was significant for several chronic comorbidities as well as a left-sided mastectomy and implantation of an AICD. The patient's admission was complicated by another ground-level fall which caused significant head trauma resulting in intubation and emergency surgery. Post-surgery, the patient was maintained on mechanical ventilation due to decreased mentation, which is when paradoxical breathing was noted. A chest computed tomography (CT) revealed worsening of an intercostal lung herniation extending to the AICD pocket.

Conclusion: After chart review, it was discovered that the lung herniation had developed at least twenty-five months prior to this hospital admission, yet well after her AICD placement. This patient's chronic comorbidities and multiple surgeries increased her intrathoracic pressure and decreased her thoracic wall strength, leading to lung herniation development. Asymptomatic lung herniation extending to an AICD pocket, though rare, should be considered as a potential complication in patients with similar comorbidities. In retrospect, if the patient's chronic herniation was discovered and surgically fixed prior to her being placed on mechanical ventilation, worsening of her herniation, and this added complication, could have been potentially mitigated.

Key Words: Asymptomatic lung herniation, AICD, surgical treatment

Introduction

This report describes an unusual case of a chronic lung herniation extending to a subcutaneous AICD pocket.

- Lung herniation is a rare phenomenon in which the lung parenchyma projects through a fascial defect in the chest wall (1).
- The detection of such herniations is critical to prevent increased morbidity and mortality as well as unwanted complications (2).
- Only one report was identified of a herniation into an AICD pocket (3). Unlike the previously reported patient who became symptomatic two months after AICD placement, our patient was asymptomatic for eleven years.

Case Presentation

Patient: An 83-year-old female admitted by the trauma service for an acute T5 compression fracture following a ground-level fall in April 2019.

Medical History: COPD, HTN, CHF with AICD placement, GERD, Coronary artery disease, obesity, and left-sided breast cancer.

Surgical History:

May 2008 – stenting and implantation of AICD
Dec. 2014 – left-sided lumpectomy
April 2017 – left-sided lumpectomy
May 2017 – left total mastectomy

Work-up: Chest CT noted chronic left, anterolateral chest wall pleural herniation. No external deformities were noted. The patient maintained symmetric chest wall expansion and normal respiratory rate.

Day 2 of Admission:

- The patient had another fall in her room, where a brain CT revealed a subdural hematoma with significant midline shift.
- Her mental status acutely declined resulting in intubation, emergent craniotomy and subgaleal drain placement.
- Post craniotomy, the patient was maintained on the ventilator when paradoxical breathing was observed.
- A repeat chest CT demonstrated worsening of the herniation through the left third intercostal space where a lead of the biventricular AICD entered (Fig. 1).

Imaging

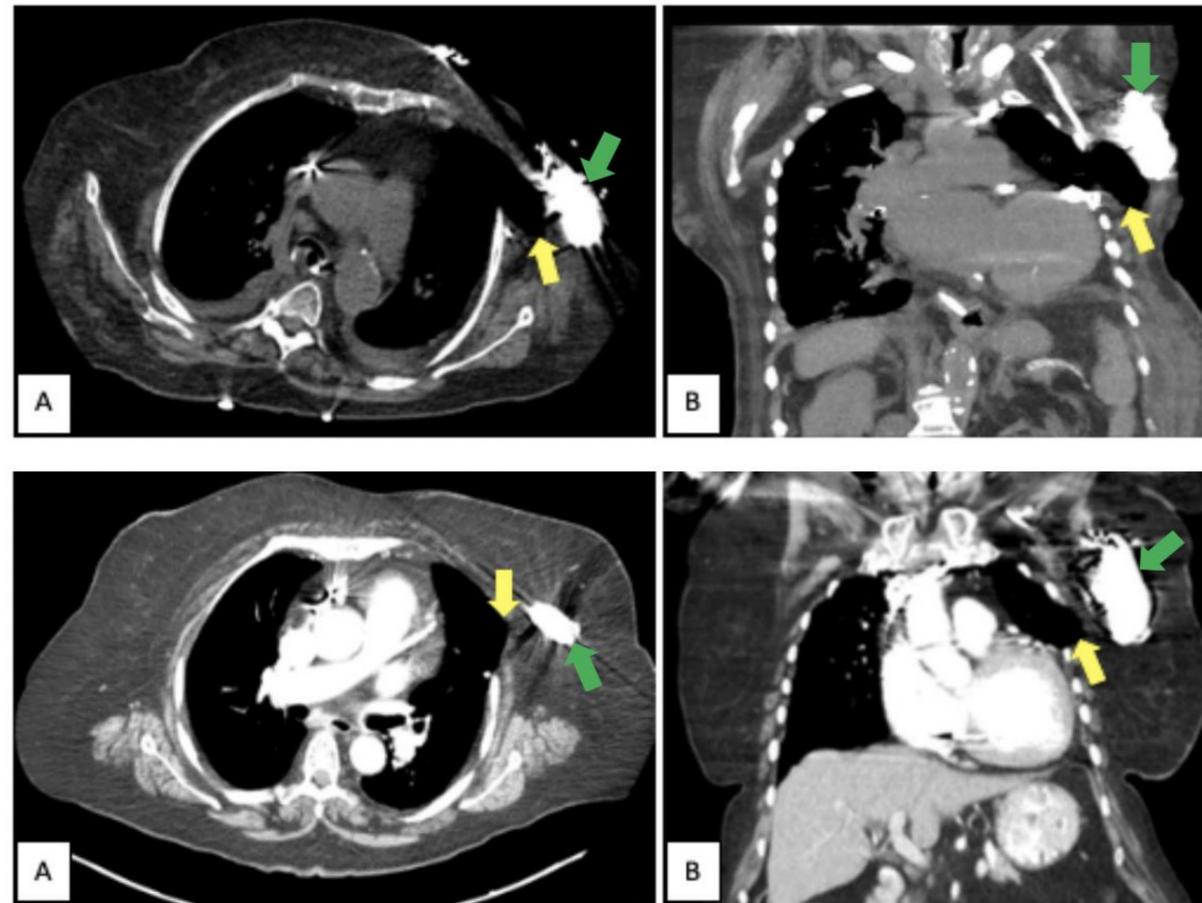


Figure 1. CT Chest Axial (A) and Coronal (B) views from April 2019. Images A and B taken after the patient was placed on mechanical positive pressure ventilation. They reveal the worsened left-sided intercostal lung herniation that extends to the AICD device. Herniation is indicated by the yellow arrows while the AICD device is indicated by the green arrows.

Figure 2. CT Chest Axial (A) and Coronal (B) views from March 2017. The early state of left-sided intercostal lung herniation is shown without full extension to the AICD device as indicated by the yellow arrows. The AICD device is specified by the green arrows. The CT images were recorded two months prior to the patient's left total mastectomy. A false-negative reading of the study had occurred at the time.

Discussion

- Intercostal lung herniations occur infrequently and often present with chest pain, dyspnea, or parenchymal strangulation (3).
- Lung herniations develop due to a combination of increased thoracic pressure and decreased compartment wall strength (4,5).
- There's controversy regarding surgical repair of asymptomatic herniations since most herniations without lung strangulation do not cause harm to the patient (6,7).

- It's suspected that the insertion of the patient's AICD and further surgical trauma to the thoracic region caused weakening of the chest wall fascia where the biventricular leads entered the cavity.
- CT imaging prior to the patient's mastectomy in 2017, demonstrated early stages of intercostal pleural herniation under her AICD (Fig. 2).
- This was not reported on the radiologic read and lead to a missed diagnosis.

- Literature suggests surgical correction of asymptomatic herniations would improve patient morbidity & mortality (2,8).
- The worsening of the herniation could have potentially been mitigated if it was detected and surgically corrected prior to the admission
- Lung herniation extending to an AICD pocket, though rare, can be considered as a potential complication of mechanical ventilation in patients with similar comorbidities.

Day 4 of Admission:

- The patient was extubated and the subgaleal drain was removed.

Day 5 of Admission:

- Thoracic surgery was consulted and opted for conservative management due to improvement in the patient's respiratory and clinical status.
- Subsequently the patient neurologically worsened and required re-intubation.
- Unfortunately, she ultimately died 17 days post trauma due to the intracranial bleed.

Conclusion

- This case presents an untreated asymptomatic herniation that extended through an area of weakness next to the patient's AICD biventricular leads.
- The herniation worsened due to mechanical ventilation for an unrelated illness and added an unnecessary complication.
- This case demonstrates the value of detection and surgical correction of asymptomatic lung herniations.

Lessons Learned

- Asymptomatic lung herniations have the potential to worsen and should be surgically corrected once detected.
- Intercostal lung herniations should not be overlooked in patients with an AICD and comorbidities that increase intrathoracic pressure.

References

1. Hamel M, Ghazal AS, Ullah W, Sarwar U, Patel R. Spontaneous Lung Herniation Leading to Extensive Subcutaneous Emphysema, Pneumothorax, Pneumomediastinum, and Pneumopericardium. *Cureus*. June 2018; doi:10.7755/cureus.3962
2. Berry, Brock, et al. "Acquired Intercostal Lung Herniation: Conservative Management May Lead to Continuation of Symptoms and Other Adverse Consequences." *General Thoracic and Cardiovascular Surgery*, 2019. doi:10.1007/s12474-019-0150-w
3. Ahmed, Ashraf, and "Jamina Begum." "Lung Herniation in the Implantable Cardioverter Defibrillator Pocket." *BMJ Case Reports*, 2015. doi:10.1136/bcr-2015-207051
4. Seif, Chuan, et al. "Pulmonary Hernia: Case Report and Review of the Literature." *Angiology Case Reports*, vol. Wiley & Sons, LLC, 2018. doi:10.1111/acsc.12150
5. Kallagi Athanasias, Erik Bagge, Andre Simon, Axel Haverich. Lung Herniation: a rare complication in minimally invasive cardiothoracic surgery. *European Journal of Cardio-Thoracic Surgery*, Volume 33, Issue 5, May 2008, Pages 770-771
6. Weisberg, G., and "Andy Y. Hennis of the Lung." *Annals of Thoracic Surgery*, Dec 2002; 74(6):1963-66
7. Tomita, Takao, Takao, William, Green, David, Werny, Joseph. Herniation of the lung after video-assisted thoracic surgery. *Ann Thorac Surg*, 2001; 71(2):606-607. doi:10.1054/s0003-4975(00)02515-5
8. Arvanis M, Chino A, Sacco G, Hesse F, "Multifactorial pulmonary hernia." *J Thorac Cardiovasc Surg*, 2006; vol. 122, pp. 619-621