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Case Report

Capsular pneumatosis: A rare radiographic sign for internal breast implant capsule violation in trauma ☆

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ABSTRACT

Breast augmentation is considered one of the most commonly performed procedures by aesthetic plastic surgeons, representing 16 % of all global plastic surgery procedures in 2020. Given the fact that thoracic trauma comprises over 20 % of trauma worldwide, it is unsurprising that there is potential for overlap between these two patient populations. Here, we present the case of a 59-year-old patient who had undergone bilateral breast augmentation over 10 years prior to presentation. They arrived as a highest-level trauma activation after being a helmeted cyclist struck by a motor vehicle resulting in significant left-sided thoracic trauma. Following stabilization in the trauma bay, CT imaging of the thorax demonstrated multifocal left pulmonary contusions and lacerations, multiple left-sided rib fractures (ribs 2–12), a small left pneumothorax, and left-sided subcutaneous emphysema. Imaging also demonstrated the presence of bilateral breast implants with the left implant appearing irregular in shape with the retropectoral space corresponding to the implant capsule having evidence of significant free air (capsular pneumatosis) concerning for acute traumatic rupture of the capsule. While undergoing surgical stabilization of her left-sided rib fractures, one of her ribs was noted to have violated the posterior wall of the breast capsule. Upon implant removal, the implant

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was found to have ruptured with tears in the shell corresponding to patient's rib fractures. This case represents a rare and unexpected complication of traumatic rib fractures; mainly the traumatic rupture of a silicone breast implant, which was identified by the presence of capsular pneumatosis on CT imaging. Presence of this rare radiographic sign (capsular pneumatosis) in the setting of a patient who has undergone breast augmentation should raise concern for possible implant rupture and capsule violation, even in the absence of external signs of penetrating injury.

Introduction

Worldwide, breast augmentation is considered one of the most commonly performed procedures by aesthetic plastic surgeons, representing 16.0 % of all global plastic surgery procedures 2020.[1] This pattern holds true for the United States where breast augmentation has remained one of the top 5 cosmetic procedures since 2006 with over 193,000 breast augmentations performed in 2020.[2] It is not surprising then that many patients who suffer traumatic injuries have a history of breast augmentation. Thoracic trauma in particular, which comprises over 20 % of trauma worldwide, poses significant risk to implant stability secondary to both the nature of the traumatic forces experienced during such an event and the secondary injuries which they may cause, such as rib fractures.[3,4] In this report, we describe an unusual case of breast implant penetration secondary to traumatic rib fractures. These injuries resulted in the radiographic finding of free air within the breast implant capsule (capsular pneumatosis) without external signs of penetrating breast trauma. In trauma patients with a history of breast augmentation, a high index of suspicion must be maintained for the potential of traumatic breast implant and capsular violation, especially in the presence of significant accompanying thoracic injuries.

Case report

A 59-year-old patient who had undergone bilateral breast augmentation with silicone implants over 10 years prior to presentation, arrived to our hospital as a highest-level trauma activation after being a helmeted cyclist struck by a motor vehicle which resulted in significant left sided thoracic trauma. In the field the patient had been hypotensive, though her blood pressure improved following left chest needle decompression and an IV fluid bolus. On arrival to the trauma bay she was found to have decreased left-sided breath sounds with palpable crepitus over the left chest but no evidence of external penetrating wounds on the patient's bilateral breasts.

Given decreased breath sounds on the left side, a chest tube was placed emergently.

X-rays of the chest and pelvis were then obtained in the trauma bay which revealed multiple left-sided rib fractures and multifocal airspace opacities on the left (Figure 1). The patient underwent trauma CT imaging which in addition to demonstrating intrabdominal injuries and a left traumatic diaphragmatic injury with resultant herniation of abdominal contents into the left chest, also demonstrated significant thoracic trauma including multifocal left pulmonary contusions and lacerations, multiple left-sided rib fractures (ribs 2–12), a small left pneumothorax, left-sided subcutaneous emphysema, and irregular shape of the patient's left breast implant including free air within the retropectoral space corresponding to the implant capsule (capsular pneumatosis) (Figure 2).

The patient was taken emergently to the OR where an exploratory laparotomy with repair of left-sided traumatic diaphragmatic injury was conducted. Given concern of a left breast implant rupture

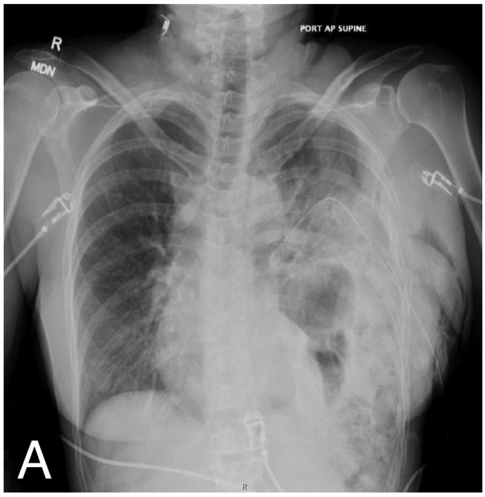

Figure 1. Chest X-ray obtained at time of presentation demonstrating multiple left-sided rib fractures.

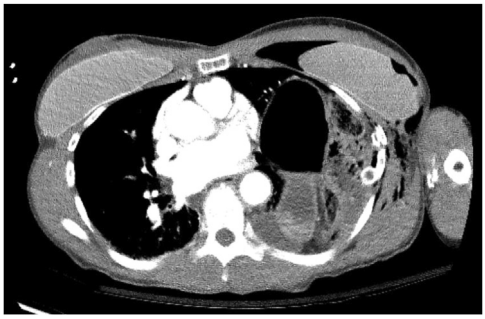

Figure 2. CT imaging demonstrating evidence of left breast implant shape irregularity as well as presence of left capsular pneumatosis.

and possible communication between the breast capsule and left thorax, following the patient's initial operation the Plastic Surgery service was consulted to plan for investigation of the capsule and removal of the implant.

Three days following presentation and initial operation, the patient returned to the OR for surgical stabilization of left-sided rib fractures. When a subpectoralis flap was raised to allow for exposure of the underlying rib fractures, one of the ribs was noted to have violated the breast capsule. Plastic surgery was present to assess the capsule intraoperatively and on exploration of the pocket it was found to have no other obvious areas of violation. The breast implant was removed and on examination was found to have ruptured. The implant had been torn in two locations as a result the patient's rib fractures (Figure 3A) and on palpation silicone was easily expressed (Figure 3B). These tears in turn appeared to correspond with significantly displaced adjacent rib fractures seen on CT reconstruction of the chest (Figure 4).

After implant removal the capsule was irrigated and a drain was left in place. The patient progressed well postoperatively and was eventually discharged to inpatient rehab 5 days following takeback, after drain removal. As the patient's silicone breast implants had been originally placed more than 10 years prior to her presentation, following rehabilitation and resolution of acute traumatic injuries the patient underwent elective removal of the remaining silicone implant with placement of bilateral saline implants.

Figure 3. Intraoperative images of left silicone breast implant after removal from violated breast demonstrating evidence of implant rupture with extrusion of silicone.

Discussion

In the United States, thoracic trauma has been found to comprise up to 15 % of trauma-related admissions to hospitals and nearly 35 % of trauma related deaths.[4,5] Traumatic rib fractures in turn represent the most common type of injury sustained following thoracic trauma and are primarily the result of high impact forces directed to the chest; such as those experienced in falls, assaults, or motor vehicle collisions. To physicians caring for such patients, rib fractures pose great clinical significance as without proper management or intervention they are associated with decreased long-term quality of life, increased pulmonary morbidity, and increased mortality.[6,7]

Given their location and mechanism injury, in the acute trauma setting rib fractures are often associated with the development of intrathoracic complications including pneumothorax, hemothorax, pneumomediastinum, and pneumopericardium.[8] A rarer but still reported complication of traumatic rib fractures is their potential to cause secondary penetrating trauma to surrounding tissues and structures such as the lungs, heart, and spleen.[8,9] However, to our knowledge this is the first reported case of an enclosed breast implant rupture secondary to penetration by a fractured rib.

Following placement of breast implants, a capsule of fibrous tissue forms around the implant. This plane between the implant and this fibrous capsule serves as a potential space allowing for air trapping within the capsule itself which can then be seen on CT imaging (capsular pneumatosis).

There have been published reports of similar radiographic findings demonstrating free air both within breast implant capsules or the surrounding breast tissue. While rare causes of such a finding include infection or iatrogenic injury, the most common cause appears to be the result of either external penetrating trauma to the breast or blunt thoracic trauma with the development of an accompanying pneumothorax.[10–12] Indeed, concern for breast implant violation should be high in the differential for providers caring for patients who have experienced thoracic penetrating injuries. However, as our case demonstrates, even in the absence of external penetrating injury, the identification of intracapsular air in a trauma patient should raise concern for potential internal breast capsule violation and implant rupture, especially if associated with the presence of accompanying rib fractures.

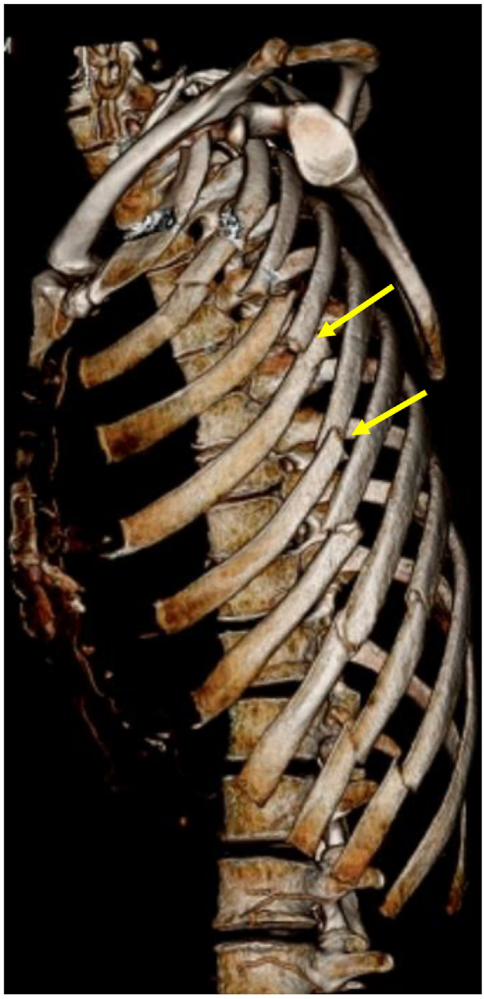

Figure 4. CT reconstruction of patient's rib fractures. Arrows indicate the fractures suspected to have violated the patient's implant capsule.

Conclusion

Traumatic rupture of a silicone breast implant is an unexpected and rare complication of traumatic rib fractures. In trauma patients who have undergone a breast augmentation, presence of capsular pneumatosis on radiographic imaging should raise concern for possible implant rupture and capsular violation, even in the absence of external signs of penetrating injury.

Conflict of Interest

None declared.

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Ethical approval

Not required.

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