

BRIEF ARTICLES

Blistering Rash over Broken Ribs

Kathleen R. Graham, MD¹, Bethany R. Rohr, MD², Victor J. Marks, MD³

¹Department of Internal Medicine, Summa Health System, OH

²Department of Dermatology, University Hospitals, OH

³Department of Dermatology, Geisinger Health System, Danville, PA

ABSTRACT

Fracture blisters are painless fluid-filled bullae most commonly located over fractures of the distal tibia and humerus. They are diagnosed clinically. Invasive procedures and treatments increase the risk of wound infection and should be avoided. While there is no consensus on management, evidence supports leaving the blisters intact and treating erosions with topical barrier ointments or topical antibiotics. We present a rare case of a 55-year-old man with fracture blisters located superficial to trauma-induced rib fractures that were successfully treated with topical mupirocin.

INTRODUCTION

Fracture blisters are the result of skin separation with fluid collection at the dermal epidermal junction (DEJ). These bullae are an uncommon complication of fractures. Following a traumatic injury, patients should be monitored for the formation of fracture blisters. Bullae usually develop within 24-48 hours after injury, but have been documented as early as 6 hours.¹ Prompt recognition and identification can improve management plans. We present a case of a 55-year-old man with fracture blisters found in a previously undocumented location.

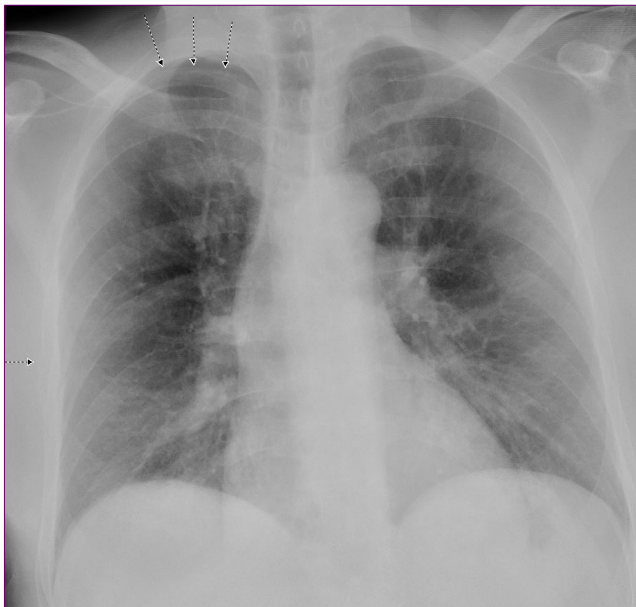
CASE PRESENTATION

A 55-year-old man presented to the emergency department one day after a fall while intoxicated. After chest X-ray was performed, he was diagnosed with right-

sided 5th and 6th rib fractures, a pulmonary contusion, and a pneumothorax secondary to the impact (Figure 1). Dermatology was consulted for a blistering rash overlying the site of the rib fractures. The patient reported that the blisters were not initially present at the time of injury but were noticed the next morning at the time of this encounter. He denied associated pain, pruritus, or a personal or family history of blistering diseases. Exam revealed a six-centimeter pink patch with multiple overlying clear-to-yellow serous fluid filled bullae and an erosion at the site of a ruptured bulla on the right lateral chest wall overlying the rib fractures (Figure 2). Differential included fracture blisters, Varicella zoster virus, Herpes simplex virus, bullous pemphigoid, bullous arthropod. Routine bacterial culture and viral polymerase chain reaction for Varicella-zoster virus and Herpes simplex virus types 1 and 2 from the base of a ruptured bulla were negative, and the patient was diagnosed with fracture blisters. The

patient quickly improved with topical mupirocin ointment and gauze dressings applied to the bullae and erosions. At one-month follow-up, the patient noted complete resolution of the bullae without subsequent rash.

Figure 1. AP Chest X-ray during expiration. The top three arrows point to the pneumothorax, and the right bottom arrow points to the rib fractures.



DISCUSSION

Fracture blisters are subepidermal bullae that form superficially to an underlying fracture.^{1,2} Traumatic injury creates shearing forces, hypoxia, and increased interstitial pressure that contribute to epidermal-dermal separation and fluid collection.²⁻⁶

The epidermis and dermis differ in biomechanical properties, which allows for shearing forces to cause separation at the DEJ.^{1,3} The more severe the mechanism of injury the greater the risk for fracture blister formation. The patient in our case experienced a fall while intoxicated and was unable to provide more details regarding the mechanism of injury. The presence of his

pneumothorax and pulmonary contusion suggests a high-energy trauma, which placed him at higher risk for developing fracture blisters. Certain comorbidities that impair skin integrity can further contribute to fracture blister formation- including smoking, alcoholism, and diabetes mellitus.^{1,4} Trauma patients often have multiple comorbidities placing this population at a higher risk for fracture blister development.⁷

Figure 2. Image of the right lateral chest wall overlying the 5th and 6th ribs shows a six-centimeter pink patch with multiple clear-to-yellow serous fluid filled bullae and an erosion.



Fracture blisters are a clinical diagnosis and identification can prevent unnecessary biopsies or other interventions. The blisters are classically painless. Blood-filled blisters are flaccid, while serous-filled blisters are tense.¹ Blister formation is typically noticed within 24-48 hours of injury, but has been recorded at as early as 6 hours and as late as 3 weeks after injury.^{1,2} Typical blister locations include the distal tibia and humerus.^{1,2,5,8} The patient in our case developed fracture blisters over fractured

ribs, which is a location that has not been previously documented.

Prevention strategies include elevation of the affected extremity and early surgical fixation before presence of blisters.^{1,5} There is no consensus on the treatment for fracture blisters.⁴ Current evidence recommends avoiding surgery when fracture blisters are present. If the patient requires an emergent operation, then incision directly through blood-filled blisters should be avoided as it is associated with higher morbidity.³ There is conflicting evidence on whether to leave the blisters intact or de-roof them.^{1,4} Fracture blister fluid is sterile, but when blisters are de-roofed, bacterial colonization occurs rapidly and can be a source of morbidity.¹ The use of topical barrier ointment, silver sulfadiazine, or a topical antibiotic on spontaneously ruptured blister beds is recommended.^{3,6} A recent case study described the addition of an oral antibiotic with blister rupture to prevent complications.⁹ On average, serous filled blisters re-epithelialize in 12 days and blood filled blisters in 16 days.³

CONCLUSION

Fracture blisters are an uncommon complication of trauma-induced fracture.^{1,8} While typically found at the distal tibia or humerus, fracture blisters can be found at other locations. Clinicians should maintain a high index of suspicion for fracture blisters when evaluating trauma patients as early identification can improve patient care by providing proper management and preventing invasive procedures.

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Corresponding Author:

Kathleen R Graham, MD
 Department of Internal Medicine
 Summa Health System
 55 Arch Street, Ste 1B
 Akron, OH 44304
 Phone: 330-714-3978
 Email: grahamkat@summahealth.org

References:

1. Refs Varela C, Vaughan TK, Carr J, et al. Fracture Blisters: Clinical and Pathologic Aspects. *J of Orthopedic Trauma*. 1993;7(5):417–27.
2. Wallace GF, Sullivan J. Fracture Blisters. *Clin Podiatric Med Surg*. 1995;12(4):801–12.
3. Giordano CP, Koval KJ, Zuckerman JD, Desai P. Fracture blisters. *Clin Orthop Relat Res*. 1994;(307):214-221.
4. Strauss E, Petrucelli G, Bong M, Koval K, Egol K. Blisters Associated with Lower Extremity Fracture: Results of a Prospective Treatment Protocol. *J of Orthopedic Trauma*. 2006 Oct;20(9):618–622.
5. Ballo F, Maroon M, Millon SJ. Fracture blisters. *J Am Acad Dermatol*. 1994;30:1033-1034.
6. Finklea LB, Becker LE. Hemorrhagic and serous-filled vesicles and bullae. Fracture blisters. *JAMA Dermatol*. 2013;149:751-756.
7. Tan CP, Ng A, Civil I. Co-morbidities in trauma patients: common and significant. *N Z Med J*. 2004;117:U1044.
8. Uebbing CM, Walsh M, Miller JB, Abraham M, Arnold C. Fracture Blisters. *West J Emerg Med*. 2011;12(1):131-133.
9. Halawi MJ. Fracture Blisters After Primary Total Knee Arthroplasty. *Am J Orthop*. 2015;44(8):E291-E293.