

INTRATHORACIC VISCERAL INJURIES



Mustafa KUZUCUOĞLU¹
Cenk BALTA²

Thoracic trauma is the most common cause of death after cranial trauma in trauma-related deaths. Thoracic traumas include a wide spectrum from rib fractures to major vascular injuries. Thoracic traumas are examined in two groups as blunt and sharp. Blunt traumas constitute 90% of all thoracic traumas. Although penetrating traumas are observed less frequently, the mortality rate is higher [1].

PULMONARY PARENCHYMAL INJURIES

After chest traumas, lung parenchymal injury can result in various forms, including contusion, laceration, pulmonary hematoma, and traumatic pulmonary cysts. Lungs are injured in trauma patients with either direct or indirect mechanisms. Severe lung injuries can be seen in approximately one-third of cases exposed to chest trauma.

Pulmonary Contusion

Pulmonary contusion is the most common lung injury condition in thoracic trauma. It is seen in 30-75% of severe chest trauma cases [2]. It can occur in both penetrating injuries and blunt trauma. Trauma patients with pulmonary contusion are at higher risk than other trauma patients due to complications such as pneumonia, acute respiratory distress syndrome (ARDS), or persis-

tent respiratory failure. In some series, mortality was reported as 11% in patients with severe isolated pulmonary contusion and up to 22% if there are other accompanying trauma findings. In comparison, it has been observed that 17% of patients with isolated pulmonary contusion develop ARDS. This rate increases to 78% in cases where there are two or more accompanying other organ injuries [3].

Depending on the degree of parenchymal lung damage, many pathophysiological changes up to respiratory failure develop. Bleeding into the uninjured lung segments causes bronchospasm and further impairs alveolar functions. Besides, pulmonary functions are frequently impaired due to increased mucus production, decreased removal from the airways, and decreased surfactant production [4]. This situation manifests itself in the clinic as; hypoxia, hypercapnia, and increased respiratory effort. Tachypnea, rhonchus or wheezing, and occasionally hemoptysis can be seen in patients. The clinical appearance of lung parenchymal damage can be insidious. Respiratory failure and the appearance of radiological findings can occur hours after the injury. Generally, radiologically visualized pulmonary contusion improves within 3-5 days, but lung functions may worsen in the late period. It is often due to local inflammatory response due to trauma, blood sequestering to alveoli, secondary systemic inflam-

¹ Assoc. Prof. Izmir Katip Celebi University, School Of Medicine, Department Of Surgical Medical Sciences, Department Of Thoracic Surgery, İzmir mustafakuzucuoglu@hotmail.com

² Asst. Prof. Balikesir University, School Of Medicine, Department Of Surgical Medical Sciences, Department Of Thoracic Surgery, Balikesir drcenkbalta@gmail.com

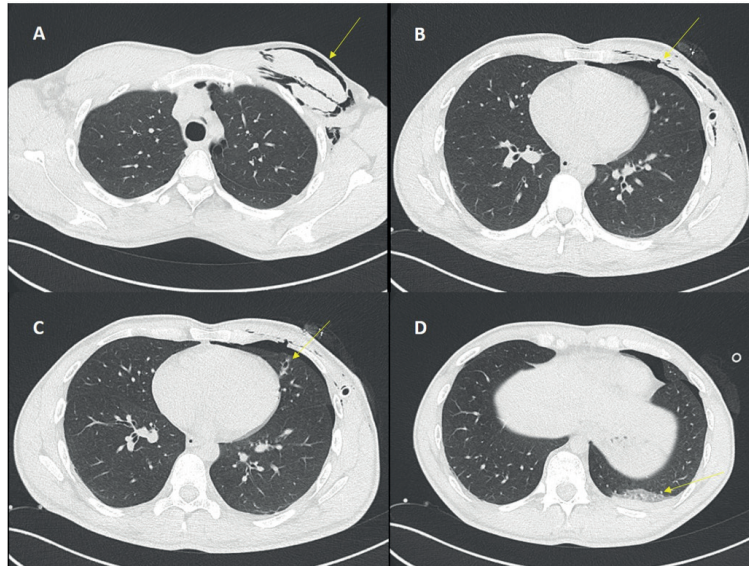


Figure 1: Thoracic computed tomography image of a 29-year-old male patient admitted for stab injury. A) subcutaneous emphysema due to parenchymal laceration, B) defect in the thoracic wall due to stab injury, C) parenchymal laceration, D) pulmonary contusion and hemothorax in the posterobasal region.

rate is low in isolated injuries of the diaphragm, but usually, this rate increases to 15-40% with additional traumatic pathologies. Primary repair should be performed by thoracic or abdominal approach following diagnosis. When the defect is large in blunt trauma injuries, various patches can be used for the defect [25,36].

REFERENCES

- Balta C, Kuzucuoglu M. Analysis of Thoracic Trauma Patients who were treated in the Thoracic Surgery Clinic. *SCIE*. 2020; 31(3): 232-234.
- Chopra PS, Kroncke GM, Berkoff HA, Dacumos GC, Kahn DR. Pulmonary contusion a problem in blunt chest trauma. *Wis Med J* 1977; 76: S1-3.
- Demuth WE Jr., Smith JM. Pulmonary contusion. *Am J Surg* 1965; 109: 819-23.
- Demling RH, Pomfret EA. Blunt chest trauma. *New Horiz* 1993; 1: 402-21.
- Moseley RV, Vernick JJ, Doty DB. Response to blunt chest injury: A new experimental model. *J Trauma* 1970; 10: 673-83.
- Svennevig JL, Bugge-Asperheim B, Birkeland S, Bjorgo S. Efficacy of steroids in the treatment of lung contusion. *Acta Chir Scand Suppl* 1980; 499: 87-92.
- Peters S, Nicolas V, Heyer CM. Multidetector computed tomography-spectrum of blunt chest wall and lung injuries in polytraumatized patients. *Clin Radiol* 2010; 65: 333-8.
- Wagner RB, Crawford WO Jr., Schimpf PP. Classification of parenchymal injuries of the lung. *Radiology* 1988; 167: 77-82.
- Gavelli G, Canini R, Bertaccini P, Battista G, Bna C, Fattori R. Traumatic injuries: Imaging of thoracic injuries. *Eur Radiol* 2002; 12: 1273-94.
- Kacmarek RM. The mechanical ventilator: Past, present, and future. *Respir Care* 2011; 56: 1170-80.
- Martin MJ, McDonald JM, Mullenix PS, Steele SR, Demetriades D. Operative management and outcomes of traumatic lung resection. *J Am Coll Surg* 2006; 203: 336-44.
- Ulutas H, Celik MR, Ozgel M, Soysal O, Kuzucu A. Pulmonary pseudocyst secondary to blunt or penetrating chest trauma: Clinical course and diagnostic issues. *Eur J Trauma Emerg Surg* 2015; 41: 181-8.
- Shirakusa T, Araki Y, Tsutsui M, Motonaga R, Iwanaga M, Ogami H et al. Traumatic lung pseudocyst. *Thorax* 1987; 42: 516-9.
- Kang J, Litmanovich D, Bankier AA, Boiselle PM, Eisenberg RL. Manifestations of systemic diseases on thoracic imaging. *Curr Probl Diagn Radiol* 2010; 39: 247-61.
- Miller DL, Mansour KA. Blunt traumatic lung injuries. *Thorac Surg Clin* 2007; 17: 57-61.
- Hankins JR, Attar S, Turney SZ, Cowley RA, McLaughlin JS. Differential diagnosis of pulmonary parenchymal changes in thoracic trauma. *Am Surg* 1973; 39: 309-18.
- Feghali NT, Prisant LM. Blunt myocardial injury. *Chest* 1995; 108: 1673-7.
- Karrel R, Schaffer MA, Franaszek JB. Emergency diagnosis resuscitation and treatment of acute penetrating cardiac trauma. *Ann Emerg Med* 1982; 11: 504-17.
- Brown J, Grover FL. Trauma to the heart. *Chest Surg Clin N Am* 1997; 7: 325-41.
- Martin LF, Mavroudis C, Dyess DL, Gray LA Jr, Richardson JD. The first 70 years experience managing cardiac disruption due to penetrating and blunt injuries at the University of Louisville. *Am Surg* 1986; 52: 14-9.

21. Wisner DH, Reed WH, Riddick RS. Suspected myocardial contusion. Triage and indications for monitoring. *Ann Surg* 1990; 212: 82-6.
22. Rodriguez A, Ong A. Delayed rupture of a left ventricular aneurysm after blunt trauma. *Am Surg* 2005; 71: 250-1.
23. Tenzer ML. The spectrum of myocardial contusion: a review. *J Trauma* 1985; 7: 443-5.
24. Bruschi G, Agati S, Iorio F, Vitali E. Papillary muscle rupture and pericardial injuries after blunt chest trauma. *Eur J Cardiothorac Surg* 2001; 20: 200-2.
25. Ozcelik C, Alar T. Künt toraks travmaları. Ch:59, pp:837-858. In: Okten I, Kavukçu HA (editors). *Göğüs Cerrahisi*. 2013. İstanbul Tıp.
26. Dogan R, Alpat S. Kalp ve büyük damarların yaralanmaları. Ch:85, pp:845-866. In: Yuksel M, Balcı AE (editors). *Göğüs Cerrahisi "Kırmızı Kitap" 2nd*, 2015. Nobel Tıp.
27. Eren S, Meteroglu F. Penetran toraks travmaları. Ch:58, pp:819-836. In: Okten I, Kavukçu HA (editors). *Göğüs Cerrahisi*, 2013. İstanbul Tıp.
28. Tambyraja AL, Scollay JM, Beard D, Henry JM, et al. Aortic trauma in Scotland –a population based study. *European journal of vascular and endovascular surgery: the official journal of the European Society for Vascular Surgery* 2006;32:686-689.
29. McGwin G, Reiff DA, Moran SG, Rue LW. Incidence and characteristic of motor vehicle collision-related blunt thoracic aortic injury according to age. *The Journal of Trauma* 2002;52:859-866.
30. Williams JS, Graff JA, Uku JM, Steinig JP. Aortic injury in vehicular trauma. *Ann Thorac Surg* 1994;57:726-30.
31. Sturm JT, Hankins DG, Young G. Thoracic aortography following blunt chest trauma. *Am J Emerg Med* 1990;8:92-6.
32. Fatimi SH, Hanif HM, Awais A, Shamsi G, et al. Major thoracic vessels and cardiac trauma: case series from a center in a developing countries. *Ulus Travma Acil Cerrahi Derg* 2012;18 (6):490-494.
33. Fabian TC, Davis KA, Gavant ML, Croce MA, Melton SM, Patton JH Jr, et al. Prospective study of blunt aortic injury: helical CT is diagnostic and antihypertensive therapy reduces rupture. *Ann Surg* 1998;227:666-77.
34. Chung JH, Mullins CD, Manchanda V, Gunn ML, et al. Pulmonary artery intimal injury associated with blunt trauma. *Emergency Radiology* 2009;16:497-499.
35. Cubuk S, Yucel O. Penetran toraks travmaları. Ch:84, pp:837-844. In: Yuksel M, Balcı AE (editors). *Göğüs Cerrahisi "Kırmızı Kitap" 2nd*, 2015. Nobel Tıp.
36. Cobanoglu U. Künt göğüs travmaları. Ch:83, pp:815-836. In: Yuksel M, Balcı AE (editors). *Göğüs Cerrahisi "Kırmızı Kitap" 2nd*, 2015. Nobel Tıp.
37. Pan H, Johnson SP. Blunt and penetrating injuries of the chest wall, pleura, diaphragm and lungs. Ch:110, pp:2843-2886. In: Locicero J, Feins RH, Colson YL, Rocco G (editors). *Shields' General Thoracic Surgery 8th*, 2019. Wolters Kluwer.
38. Davis J, Eghbalieh B. Injury to the diaphragm. pp:623-635. In Feliciano DV, Mattox KL, Moore EE (editors). *Trauma 6th*, 2008. McGraw-Hill.