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DELAYED DIAGNOSIS OF TRACHEOBRONCHIAL INJURY REVEALED DURING THORACIC SURGERY: A CASE REPORT

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ABSTRACT Tracheobronchial injury (TBI) is a potentially life-threatening injury that can result from either penetrating or blunt trauma. We report a case of a tracheal rupture occurring after a closed chest trauma to a young male patient, revealed after oral intubation, for an elective surgical management of pneumothorax. The trauma occurred 15 days before surgery, the pneumothorax was drained initially, faced with continuous bubbling and absence of pulmonary re expansion, the surgical indication was retained. The diagnosis of tracheal rupture was suspected a few minutes after tracheal intubation given the tidal volume gap displayed by the spirometry monitor and the aspiration through the tracheal tube of pleural effusion fluid. The rupture was confirmed during surgical exploration after urgent thoracotomy and which found disrepair involving the posterior face of the trachea, the carina and the initial segment of the right main bronchus.

KEYWORDS : Chest Trauma, Trachea, Main Bronchi, Airway Rupture, Bronchoscopy

INTRODUCTION

Chest trauma is the second leading cause of death in trauma cases, following head injuries. The severity of chest injuries largely depends on the kinetic energy involved at the time of impact [1]. Among these, tracheobronchial injuries are rare but often fatal. Tracheobronchial injury (TBI) can result from either blunt or penetrating trauma and is potentially life-threatening [2]. Its exact incidence is unknown, as many patients die before reaching the hospital. Clinically, it often presents with rapidly worsening dyspnea, subcutaneous emphysema, agitation due to hypoxemia, and in severe cases, circulatory collapse caused by gas tamponade [3]. Autopsy studies suggest that 2–3% of trauma-related deaths may involve TBI [4]. We report the case of a young man involved in a traffic accident whose tracheal rupture went undetected until surgery.

Case Presentation

A young male aged 29 years, was admitted to ER to a local hospital after a Traffic accident. At admission, the patient was hemodynamically stable, as blood pressure was 123/74 mmHg, heart rate at 95 bpm. He was tachypneic (28 bpm), oxygen saturation was 90% at room air, and 99% under 3l of oxygen using nasal canula. The whole-body CT-scan carried out on admission revealed a total right air effusion with collapse of the lung as well as a fracture of the anterior arches of the first 4 ribs on the left and of the right scapula. The rest of the injury assessment being unremarkable. A chest tube was placed and the patient was admitted to the thoracic surgery department (Figure 1). Clinically the patient remained stable and oxygen requirements were low. The surgical indication was given 15 days after in the face of continuous bubbling and the absence of return to the thoracic wall of the lung. The initially planned procedure was a pleural symphysis after exploration via right thoracotomy. In the operation room, the patient was placed in a supine position, general anesthesia was induced in normal sequence. The team opted for pulmonary exclusion using a left double lumen tube. Verification of the correct positioning was carried out by auscultation. Few minutes later, we witness a drastic drop in pulsed oxygen saturation, a reflux of thoracic drainage fluid through the intubation tube associated with an increase in intrathoracic pressures: A traumatic intubation is thus suspected first and leading to rapid conversion of the surgical procedure. An anterior thoracotomy is thus carried out and the exploration reveals disrepair and loss of substance encompassing the post part of the trachea, the carina and the initial segment of the right main bronchus. The loss of substance, the presence of false membranes and the absence of bleeding demonstrated the sub-acute caracter of the tracheal wound. Ventilation was maintained by inserting the tracheal tube into the left main bronchus, under visual control while occasionally sealing the breach to maintain SpO2 above 85%. Before repair could be undertaken the patient sustained a first cardiac arrest then a second and could not be resuscitated, and passed within 2 hours after the start of the procedure.

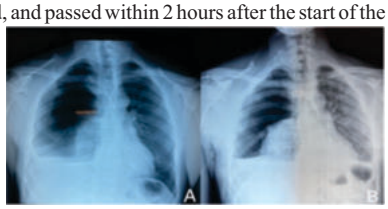

Figure 1: Panel A: chest X ray performed after first drainage. Panel B: chest X-Ray one week after: no return of the lung to the chest's wall after thoracic drainage

DISCUSSION

Tracheobronchial injuries (TBI) are rare but potentially fatal complications of blunt chest trauma. Their incidence remains difficult to establish due to the high prehospital mortality rate, reported to range from 30% to 80% [5]. Autopsy studies indicate that 2.5% to 3.2% of trauma-related deaths involve TBI [6]. The mechanism is multi-factorial and not fully understood. However, common hypotheses include sudden anteroposterior compression, rapid deceleration, cervical hyperextension, and increased intrathoracic pressure against a closed glottis [7].

TBI occurs in approximately 1% of blunt chest trauma cases, with most lesions located within 2.5 cm of the carina, particularly involving the proximal main bronchi [8]. These injuries often coexist with other severe thoracic or multisystem trauma, contributing to the high mortality rate approaching 80% [9].

The clinical presentation is often subtle and non-specific. While symptoms such as subcutaneous emphysema, respiratory distress, and persistent pneumothorax are common, they can easily be misattributed to more apparent injuries. Moreover, up to 10% of patients with TBI may lack both clinical and radiologic signs [7]. Some lesions may go undetected until complications such as recurrent atelectasis, lung collapse, or pulmonary infections develop days to weeks after the initial injury [10,11].

Early diagnosis is crucial but challenging. Although multi-slice CT has a reported sensitivity of 94%, it rarely visualizes the tracheobronchial tear directly [12]. Suggestive findings include pneumomediastinum, persistent pneumothorax despite adequate drainage, subcutaneous emphysema, and complete lung collapse [9,13]. Contrast bronchography is not routinely recommended due to its potential to aggravate lung injury [4,14].

Flexible fiberoptic bronchoscopy is the diagnostic modality of choice. It enables direct visualization of the lesion and accurate localization of the injury [15]. This examination can be performed by trained anesthesiologists or thoracic and trauma surgeons [16], although diagnostic accuracy heavily depends on operator experience [15]. Hallmark bronchoscopic findings include abrupt mucosal discontinuity, cartilage exposure, and airway obstruction by blood or collapsed bronchial segments [17,18]. In some cases, lesions may be temporarily sealed by the endotracheal tube, masking the diagnosis [19]. If flexible bronchoscopy is inconclusive and clinical suspicion remains high, rigid bronchoscopy should be considered, following cervical spine clearance [15].

A recent retrospective study by Dongsub Noh involving 47 chest trauma patients emphasized the value of fiberoptic bronchoscopy in both diagnosis and therapeutic planning for TBI [20]. Its role is pivotal not only in identifying the lesion but also in guiding further management, particularly in patients with delayed or atypical presentations.

Early recognition and intervention remain the cornerstone of improving outcomes in tracheobronchial trauma. Clinicians must maintain a high index of suspicion, especially in patients with persistent pneumothorax or unexplained respiratory compromise following chest trauma.

CONCLUSION

Bronchoscopy remains the reference examination for the diagnosis of tracheobronchial trauma, in particular in order to clarify the location and extent. It also allows in the same time a therapeutic gesture. Although if not performed before surgery, it may be rational to use it for intubation of patient with closed chest trauma as Resuscitation of a patient with TBI can be difficult, as obtaining adequate ventilation may require novel approaches to secure the airway. Furthermore, with lack of guidelines for when to perform or not bronchoscopy in cases of closed chest trauma, practitioners tend to promote its use, given its high sensitivity and specificity in detecting tracheobronchial injuries.

REFERENCES

1. Muller, M., Lefrant, J. Y., & de La Coussaye, J. E. (2005). Traumatismes fermés du thorax. Conférences d'Actualisation (Société Française d'Anesthésie et de Réanimation), 2005, 239–260.
2. Hwang, J. J., Kim, Y. J., Cho, H. M., & Lee, T. Y. (2013). Traumatic tracheobronchial injury: Delayed diagnosis and treatment outcome. Korean Journal of Thoracic and Cardiovascular Surgery, 46(3), 197–201. https://doi.org/10.5090/kjtcs.2013.46.3.197
3. Armstrong, S. M., Thavendiranathan, P., & Butany, J. (2022). The pericardium and its diseases. In Cardiovascular Pathology (5th ed., pp. 633–661). Elsevier.
4. Cassada, D. C., Munyikwa, M. P., Moniz, M. P., et al. (2000). Acute injuries of the trachea and major bronchi: Importance of early diagnosis. Annals of Thoracic Surgery, 69(5), 1563–1567. https://doi.org/10.1016/S0003-4975(00)01077-8
5. Burke, J. F. (1962). Early diagnosis of traumatic rupture of the bronchus. JAMA, 181(8), 682–685. https://doi.org/10.1001/jama.1962.03050340020005
6. Lynn, R. B., & Iyengar, K. (1972). Traumatic rupture of the bronchus. Chest, 61(1), 81–83. https://doi.org/10.1378/chest.61.1.81
7. Chesterman, J. T., & Satsangi, P. W. (1966). Rupture of the trachea and bronchi by closed injury. Thorax, 21(1), 21–27. https://doi.org/10.1136/thx.21.1.21
8. Chu, C. P., & Chen, P. P. (2002). Tracheobronchial injury secondary to blunt chest trauma: Diagnosis and management. Anaesthesia and Intensive Care, 30(2), 145–152.
9. Wintermark, M., & Schnyder, P. (2002). Imagerie des traumatismes fermés du thorax. Journal de Radiologie, 83, 123–132.
10. Hancock, B. J., & Wiseman, N. E. (1991). Tracheobronchial injuries in children. Journal of Pediatric Surgery, 26(12), 1316–1319. https://doi.org/10.1016/0022-3 4 6 8 (9 1) 90609-W
11. Mills, S. A., Johnston, F. R., Hudspeth, A. S., et al. (1982). Clinical spectrum of blunt tracheobronchial disruption illustrated by seven cases. Journal of Thoracic and Cardiovascular Surgery, 84(1), 49–58. https://doi.org/10.1016/s0022-5223(19)39515-7
12. Scaglione, M., Romano, S., Pinto, A., Sparano, A., Scialpi, M., & Rotondo, A. (2006). Acute tracheobronchial injuries: Impact of imaging on diagnosis and management implications. European Journal of Radiology, 59(3), 336–343. https://doi.org/10.1016/j.ejrad.2006.04.026
13. Cherni, N., Jouini, S., Labib, A., et al. (2007). Imagerie des traumatismes fermés du thorax. Feuillets de Radiologie, 47(2), 95–107. https://doi.org/10.1016/S0181-9801(07)88840-3
14. Halttuen, P. E., Kostiainen, S. A., & Meurala, H. G. (1984). Bronchial rupture caused by blunt chest trauma. Scandinavian Journal of Thoracic and Cardiovascular Surgery, 18, 141–144.
15. Baumgartner, F., Sheppard, B., de Virgilio, C., et al. (1990). Tracheal and main bronchial disruptions after blunt chest trauma: Presentation and management. Annals of Thoracic Surgery, 50(4), 569–574. https://doi.org/10.1016/0003-4975(90)91089-I
16. Antonescu, I., Mani, V. R., & Agarwal, S. (2022). Traumatic injuries to the trachea and bronchi: A narrative review. Mediastinum, 6, 22. https://doi.org/10.21037/med-21-21
17. Kirsh, M. M., Orringer, M. B., Behrendt, D. M., & Sloan, H. (1976). Management of tracheobronchial disruption secondary to nonpenetrating trauma. Annals of Thoracic Surgery, 22(1), 93–101. https://doi.org/10.1016/S0003-4975(10)63961-6
18. Guest, J. L. Jr., & Anderson, J. N. (1977). Major airway injuries in closed trauma. Chest, 72, 63–66.
19. Flynn, A. E., Thomas, A. N., & Schecter, W. P. (1989). Acute tracheobronchial injury. Journal of Trauma, 29(10), 1326–1330. https://doi.org/10.1097/00005373-198910000-00005
20. Noh, D. (2023). Indications and findings of flexible bronchoscopy in trauma field in Korea: A case series. Journal of Trauma and Injury, 36(3), 206–209. https://doi.org/10.20408/jti.2022.0053