Case Report

Spontaneous pneumothorax in a young male athlete: A case report with review of literature

Mirko Maglica[1,2], Ante Jurčević[3], Branimira Jurčević[4], Josip Mišković[5,6]

From [1]MD at Health Centre Livno, Livno, Bosnia and Herzegovina, [3]Surgeon, [4]Resident, Cantonal Hospital "Dr. Fra Mihovil Sučić", Livno, Bosnia and Herzegovina, [2]Teaching Assistant at School of Medicine University of Mostar, Department of Anatomy, [5]Head Surgeon at University Clinical Hospital Mostar, Department of Surgery, [6]Assistant Professor at School of Medicine University of Mostar, Deparment of Anatomy, Mostar, Bosnia and Herzegovina

ABSTRACT

Spontaneous pneumothorax (SP) is a serious and life-threatening condition often caused by ruptured apical lung bulla in young male individuals. It is commonly associated with different syndromes but also occurs in healthy individuals. In this case report, we aim to discuss the etiology, clinical course, and surgical treatment of a 21-year-old male kickboxer with a right-sided pneumothorax that occurred during a sparring session. A chest tube with negative suction was inserted to resolve the pneumothorax. Because there was no visible resolution, video-assisted thoracoscopic surgery (VATS) was performed. During VATS, a large, apically placed, ruptured lung bulla, was revealed and removed. One month after surgery, the patient is in great clinical condition. There are no signs of a recurrence of SP.

Key words: Bullae, Bullous lesion, Primary spontaneous pneumothorax, Video-assisted thoracic surgery

INTRODUCTION

Pneumothorax represents the presence of air in the pleural space due to the loss of visceral or parietal pleural membrane integrity that allows air from the environment or respiratory tract to enter and accumulate in the pleural space [1,2]. Pneumothorax can be spontaneous (primary and secondary) or acquired (traumatic and iatrogenic) [3]. Primary spontaneous pneumothorax (PSP) affects one in every 3000 men aged between 20 and 29, with spontaneous ruptured apical lung bulla being the most common cause [4]. Secondary spontaneous pneumothorax (SSP) is a far more dangerous condition than PSP [5] as it has been linked to a variety of pulmonary disorders, with secondary rupture of giant bullae being the most common [4]. This condition requires early diagnosis and adequate treatment procedures to minimize the likelihood of complications.

Here, we present the case of a 21-year-old male with complaints of chest pain for 6 h. This case, involving a young male kickboxer, shows how early detection and the proper management of sports-related pneumothorax can lead to complete resolution, preventing complications affecting the patient's later life quality and allowing an early return to physical activities, such as training.

Access this article online	
Received - 10 December 2022 Initial Review - 21 December 2022 Accepted - 19 January 2023	Quick Response code
DOI: 10.32677/ijcr.v9i1.3773	

CASE REPORT

A 21-year-old male presented to our emergency department with complaints of chest pain that had lasted for the past 6 h. Immediately after, he felt a sharp pain in the right thoracic region, before arrival in our department, he was admitted to a nearby emergency center for evaluation, where he was examined, given analgesia, and sent home. The patient reported that chest pain started during intense kickboxing sparring. However, he did report sharp pain in his right thoracic region and the inability to take a full breath. He also mentioned that he had a feeling of "breathing on 30%" during sparring and would have severe pain whenever he would cough or laugh. The patient denied any previous pneumothorax or recent trauma to the chest or back other than sparring practice. No fever, visual disturbances, headache, dizziness, abdominal pain, hematuria, or any other symptoms were reported. The patient's medical history was unremarkable, without chronic medications, previous surgeries, or hospitalizations. He also denied any allergies, smoking, vaping, or drug use.

The general examination revealed a 70 Kg young healthy man, measuring 175 cm in no acute distress. His vital signs were stable and he was afebrile with a blood pressure of 120/80 mmHg, a heart rate of 90, and a SpO_2 of 98%. Physical examination revealed an absent right lung sound at its base and apically, respectively. Furthermore, shallow breathing was present on the same side.

Correspondence to: Mirko Maglica, MD, Department of Emergency Medicine, Health Centre Livno, Trg Domovinskog rata 3, 80101 Livno, Bosnia and Herzegovina. E-mail: mirko.maglica@gmail.com

The rest of the physical examination, electrocardiogram, and laboratory analysis were unremarkable. Immediately after the examination, a chest X-ray showed a near-complete lung collapse with pneumothorax occupying around 80% of the right thoracic cavity (Fig. 1a).

After reviewing the aforementioned chest X-ray, the patient was admitted to a local hospital. A chest tube was inserted and connected to negative suction to remove the air and expand the lung. A second chest X-ray was performed to check the position of the tube (Fig. 1b). The right lung had already begun to re-expand, as shown in Figure.

The following morning, a high-resolution computed tomography (CT) revealed a large apical emphysematous bulla in the right upper lobe, as well as a residual pneumothorax occupying approximately 30% of the right pleural cavity. A radiologist also described contralateral mediastinal structures shifting. The patient was stable but there were no signs of further resolution of the pneumothorax (Fig. 1c). Later that same day, in consultation with a thoracic surgeon, the patient was referred to the tertiary institution for further treatment.

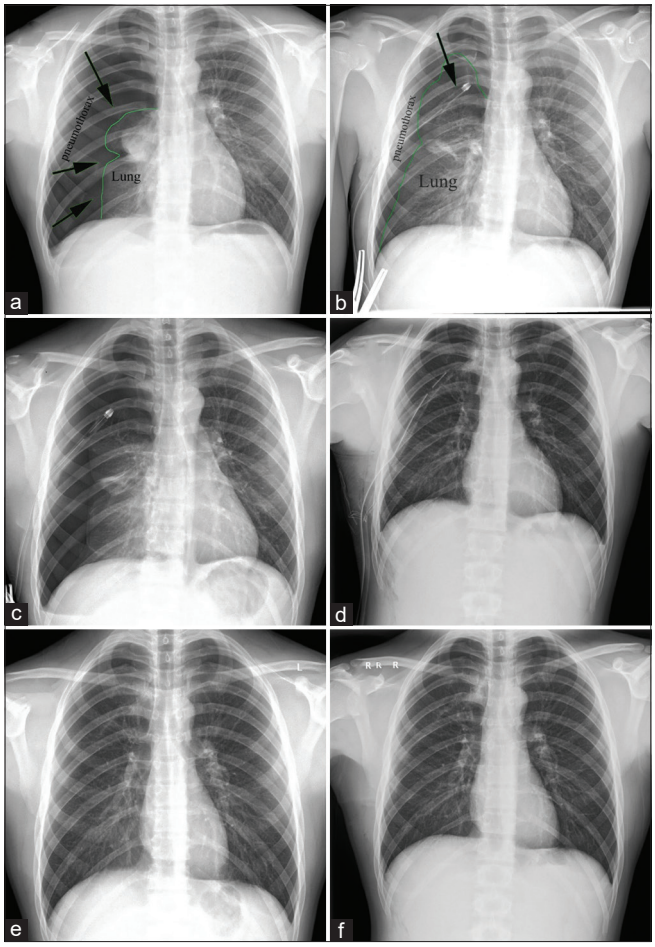

Figure 1: (a) Chest X-ray demonstrating an 80% right-sided pneumothorax; (b) chest X-ray taken half an hour after chest tube placement, demonstrating partial resolution; (c) chest X-ray taken next morning after admission showing no further resolution; (d) chest X-ray taken following video-assisted thoracoscopic surgery-bullectomy; (e) follow-up chest X-ray 6th day after surgery; and (f) follow-up chest X-ray 1 month after surgery showing complete resolution of pneumothorax.

The following day, a VATS-bullectomy of the right upper lobe was performed through three access ports. Apical pleurectomy followed to achieve mechanical pleurodesis (Fig. 1d). Postoperatively, the chest tube with the Heimlich valve was removed on the fourth postoperative day after full reexpansion of the lung was achieved. No postoperative air leak was observed. A follow-up chest X-ray taken on the 6th day after surgery revealed that the pneumothorax had completely resolved (Fig. 1e). One month after the initial presentation, the patient is in great clinical condition and has returned to sports activities and there were no signs of a recurrence of spontaneous pneumothorax (Fig. 1f).

DISCUSSION

In our case, when the patient first arrived, there was considerable uncertainty about the source of air in his right pleural cavity. Most of the pneumothoraxes that occur during sports activities are traumatic and that was our first thought but the patient denied any trauma to his thorax region and there were no visible fractures of the thoracic wall on the chest X-ray. Even though we had a suspicion of a ruptured bulla, CT confirmed our first suspicions and we were certain that this was a case of spontaneous pneumothorax (SP).

SP has an incidence of 7.4–18 cases/100,000 people each year in males and 1.2–6 cases in females [5,6]. It typically occurs in tall, asthenic male individuals who are often smokers. There is a popular belief that physical activity increases the possibility of SP. Contrary to that belief, SP typically occurs at rest; therefore, avoiding physical activity is not recommended [7]. SP in patients who have pathological lung changes is usually classified as SSP. This classification was made primarily because of the difference in prognosis as well as in management between PSP and SSP. The existence of true PSP, however, is debatable given that the majority of patients with so-called PSP appear to have abnormal lung parenchyma on chest CT scans, and as previously stated by the pneumothorax task force of the European Respiratory Society, the lines between primary and secondary pneumothorax are becoming increasingly hazy [8]. Almost all patients with SP present with ipsilateral sharp chest pain and dyspnea, which are usually mild. Physical examination depends on the volume of air inside the pleural cavity. Breath sounds are often decreased or absent, and percussion is hyper-resonant. The most common cause of SP is the rupture of a subpleural bleb or a lung bulla. [5,9]. If there is suspicion of a pneumothorax, the patient should be transported to a medical care center, and a prompt chest X-ray is mandatory as a starting point in the diagnostic workup [10].

The first step in managing SP is deciding whether an intervention is required or the patient can be managed conservatively with observation. In patients with a large or symptomatic SP, British Thoracic Surgery (BTS) recommends treatment. The BTS definition of a large pneumothorax is > 2 cm measured from the visible visceral pleura to the lateral chest wall at the level of the hilum on a chest X-ray. Furthermore, BTS states that in some patients with a large pneumothorax but minimal symptoms, conservative management may be appropriate; hence,

the decision to treat or not lies in the hands of the managing clinician. Regarding SSP, the current BTS guidelines recommend mandatory admission for at least 24 h with supplemental oxygen therapy and a chest drain [11]. Patients with a small pneumothorax (<15% of total lung volume) can be observed and do not require admission. Still, follow-up chest X-rays are necessary to rule out the enlargement of the pneumothorax. If there is no progression of pneumothorax and the patient's vitals are stable, it is appropriate to safely discharge the patient home. Weekly radiographs should be obtained until full resolution is achieved, which usually occurs within 2 weeks [12,13]. If the air leak continues and these patients have progressive collapse or non-resolution of the pneumothorax, intervention is required to drain the pneumothorax and control the air leak [11]. Guidelines by Feden *et al.* suggest that if the pneumothorax is >20% of the total lung volume or the patient has unstable vital signs, hospital admission is most appropriate, followed by evacuation with a chest tube [13,14].

If the pneumothorax does not resolve adequately after chest tube placement, thoracic surgery is usually the next step in therapeutic management. Weijiang *et al.* in their case report from 2021, suggest video-assisted thoracoscopic surgery (VATS) as a therapy of choice for bullae, the most common cause of SP [15]. The purpose of surgery is to locate and close any air leaks, remove any blebs or bullae that are visible on the visceral pleura, and then execute pleurodesis. According to studies, pleurodesis is necessary in addition to bleb/bullectomy to reduce recurrence rates [16]. A follow-up chest X-ray should be done a few weeks after discharge from the hospital to ensure there is no recurrence of pneumothorax. There is no evidence to link recurrence with physical exertion, so the patient can be advised to return to work and resume normal physical activities once their symptoms have resolved. With that being said, the patient should get back to usual physical activities 3–4 weeks after complete resolution on imaging [17]. The most recent Cochrane review found that needle aspiration had a better rate of rapid success than chest tube drainage, which might cause the BTS guidelines to be modified so that needle aspiration is advised as the first-line treatment for SSP. If conservative measures fail, the authors agree that VATS bullectomy with pleurodesis is the next line of treatment with the lowest rate of pneumothorax recurrence [18].

CONCLUSION

There are still a lot of unanswered questions regarding SP. Even though there are numerous recommendations for treating SP, most authors agree that new, standardized ones are needed. The definition of a large pneumothorax and whether a patient should be admitted and treated surgically or conservatively constitute the major disagreements in current guidelines (such as those of BTS and The American College of Chest Physicians). However, possibly in the near future, there will be one uniform consolidated recommendation and algorithm to guide practitioners who may encounter patients with this diagnosis. While our outcome was more than successful, there is a need to validate this therapeutic approach in the future research.

REFERENCES

1. Soundappan SV, Holland AJ, Browne G. Sports-related pneumothorax in children. Pediatr Emerg Care 2005;21:259-60.
2. Gilday C, Odunayo A, Hespel AM. Spontaneous pneumothorax: Pathophysiology, clinical presentation and diagnosis. Top Companion Anim Med 2021;45:100563.
3. Noppen M, De Keukeleire T. Pneumothorax. Respiration 2008;76:121-7.
4. Luh SP. Review: Diagnosis and treatment of primary spontaneous pneumothorax. J Zhejiang Univ Sci B 2010;11:735-44.
5. Noppen M, Schramel F. Pneumothorax. Eur Respir Mon 2002;22:279-96.
6. Melton LJ, Hepper NG, Offord KP. Incidence of spontaneous pneumothorax in Olmsted County, Minnesota. Am Rev Respir Dis 1979;120:1379-82.
7. Bense L, Wilman LG, Hedenstierna G. Onset of symptoms in spontaneous pneumothorax: Correlations to physical activity. Eur J Respir Dis 1987;71:181-6.
8. Tschopp JM, Bintcliffe O, Astoul P, Canalis E, Driesen P, Janssen J, *et al.* ERS task force statement: Diagnosis and treatment of primary spontaneous pneumothorax. Eur Respir J 2015;46:321-35.
9. Light RW. Management of spontaneous pneumothorax. Am Rev Respir Dis 1993;148:245-8.
10. Brukner P, Khan K. Thoracic and chest pain. In: Brukner P, Khan K, editors. Brukner and Khans Clinical Sports Medicine. 4th ed. North Ryde, N.S.W: McGraw-Hill; 2012. p. 449-62.
11. MacDuff A, Arnold A, Harvey J; BTS Pleural Disease Guideline Group. Management of spontaneous pneumothorax: British Thoracic Society Pleural Disease Guideline 2010. Thorax 2010;65:18-31.
12. Partridge RA, Coley A, Bowie R, Woolard RH. Sports-related pneumothorax. Ann Emerg Med 1997;30:539-41.
13. Feden JP. Closed lung trauma. Clin Sports Med 2013;32:255-65.
14. Blecha KM. Managing a traumatic pneumothorax. Athl Ther Today 2006;11:51-3.
15. Ma W, Deng X, Wen M, Yang L, Ouyang X, Liu X, *et al.* Axillary uniportal video-assisted thoracoscopic surgery for bullae is a cosmetically superior approach to primary spontaneous pneumothorax: A case report. J Cardiothorac Surg 2021;16:314.
16. Hatz RA, Kaps MF, Meimarakis G, Loehe F, Müller C, Fürst H. Longterm results after video-assisted thoracoscopic surgery for first time and recurrent spontaneous pneumothorax. Ann Thorac Surg 2000;70:253-7.
17. Curtin SM, Tucker AM, Gens DR. Pneumothorax in sports. Phys Sportsmed 2000;28:23-32.
18. Hallifax R, Janssen JP. Pneumothorax-time for new guidelines? Semin Respir Crit Care Med 2019;40:314-22.

Funding: Nil; Conflicts of interest: Nil.

How to cite this article: Maglica M, Jurčević A, Jurčević B, Mišković J. Spontaneous pneumothorax in a young male athlete: A case report with review of literature. Indian J Case Reports. 2023; 9(1):26-28.