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RESPIRATORY CASE REPORTS

Unilateral Hemotympanum after Bronchoscopy: A Case Report and Review of the Literature

Bronkoskopi Sonrası Tek Taraflı Hemotimpanum: Olgu Sunumu ve Literatürün Gözden Geçirilmesi

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Abstract

Hemotympanum, referring to the presence of blood in the middle ear, is an unusual complication of bronchoscopy procedures usually performed on the airways for diagnostic or therapeutic purposes. We present here a report of a 45-year-old male who presented with fever, hemoptysis and back pain in whom a mass was detected in the right middle lobe of the lung. During a bronchoscopy procedure performed for diagnostic purposes, the patient had an excessive coughing episode that may have increased middle ear pressure, leading to hemotympanum only in the right ear, evidenced by bleeding from the ear canal. The patient had a past history of myringotomy, which may have contributed to this complication, about which little is known. We draw attention to this rare complication and propose additional risk factors for the underlying pathophysiology, and stress the need for better cough suppressor strategies to avoid occurrence.

Keywords: *Bronchoscopy, hemotympanum, complication, cough.*

Öz

Orta kulakta kan varlığını ifade eden hemotimpanum, genellikle hava yollarında tanısal veya terapötik müdahaleler için yapılan bronkoskopi prosedürünün çok nadir bir komplikasyonudur. Bu yazıda ateş, hemoptizi ve sırt ağrısı ile başvuran ve akciğerin sağ orta lobunda kitle saptanan 45 yaşında bir erkek hasta sunulmuştur. Tanı amaçlı yapılan bronkoskopi işlemi sırasında hastada orta kulak basıncını artırabilecek aşırı öksürük vardı ve ilginç bir şekilde kulak yolundan kanama ile fark edilen sadece sağ kulak hemotimpanumu meydana geldi. Geçmişinde miringotomi girişiminin öyküsü olması, hakkında çok fazla şey bilinmeyen bir komplikasyona katkıda bulunan başka bir risk faktörü olabilir. Bu nadir komplikasyona dikkat çekiyoruz ve altta yatan patofizyoloji için ek risk faktörleri olabileceği ve ortaya çıkmaması için daha iyi öksürük baskılayıcı stratejilere ihtiyaç olduğunu öne sürüyoruz.

Anahtar Kelimeler: *Bronkoskopi, hemotimpanum, komplikasyon, öksürük.*

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Bronchoscopy is a medical procedure for the examination of the airways in the lungs, allowing not only the visualization and inspection of the airways, but also the collection of samples of lung tissue or fluids, and the performance of various diagnostic and therapeutic procedures. Bronchoscopy is commonly used to diagnose and evaluate such conditions as lung infections, tumors, chronic cough and lung diseases, but can also be used for therapeutic reasons, such as for the removal of foreign objects or the relief of airway obstruction, and for the endobronchial staging of lung cancer (1,2). The procedure is typically performed under local anesthesia, while sedation may be used in some cases.

Hemotympanum refers to the presence of blood in the middle ear that usually occurs as a result of trauma or injury to the ear or head. It can be caused by various factors, such as a direct blow to the ear, skull fracture or barotrauma (sudden changes in air pressure) (3,4). The diagnosis of hemotympanum is based typically on a physical examination of the ear, and proper evaluation and management are essential for optimal recovery and the prevention of complications.

The most common complications of bronchoscopy are bronchospasm, laryngospasm, hypoxemia, elevated airway pressure, hemorrhage, aspiration and medication/comorbidities-related symptoms, but here we report an unusual complication of a procedure in a patient with unilateral hemotympanum in the right following diagnostic bronchoscopy.

CASE

A 45-year-old male presented to the emergency department with fever and hemoptysis, complaining of back pain that had become more prominent within the last week and difficulty in breathing. He had hypertension in his past medical history and a myringotomy during childhood, but no bleeding disorder or any usage of anticoagulation or antiplatelet drugs. A physical examination was unremarkable, while laboratory results revealed leukocytosis (11400 /μL) with neutrophil predominance (84 %) and a high CRP level of 58.8 mg/L (R: 0-5) with normal liver and kidney function and normal D-dimer levels. Thorax computed tomography (CT) revealed a spiculated mass in the right middle lobe and surrounding ground glass opacity, together with right paratracheal, pre-carinal and subcarinal lymphadenopathies. The patient was hospitalized with a plan for diagnostic bronchoscopy, but because of the resistant fever the COVID-19 PCR and the multiplex PCR for respiratory tract infections together with sputum, blood and urine culture were performed but no pathogen could be isolated. The patient was started on ceftriaxone and clarithromycin treatment, and a diagnostic bronchoscopy was planned to investigate the airways and for the acquisition of a biopsy. The patient was given midazolam intravenously and local lidocaine for sedation, but had a pronounced coughing episode during the procedure. The bronchoscopy showed no endobronchial lesion or bleeding site. Bronchoalveolar lavage (BAL) was obtained from the right middle lobe, but the procedure was interrupted due to the sudden appearance of bleeding from the right ear. The otorhinolaryngology was consulted immediately, and an investigation with an otoscope revealed a hematoma in the anterior of the right tympanic membrane with perforation (Figure 1). Local adrenaline was applied, and a second investigation after 2 hours revealed no active bleeding, and the left tympanic membrane was intact. Ciprofloxacin ear drops were recommended for 3 days and the hemotympanum was self-limited with no other complications. A positron emission tomography–computed tomography (PET-CT) showed that the lesion (75x44 mm) had the highest SUVmax of 13.5 and all lymphadenopathies described previously on thorax CT had a SUVmax in the range of 3.9–5.9. BAL cultures were negative, and after one week of empirical antibiotic administration the mass was found to have regressed on X-ray. Due to the complication experienced during the bronchoscopy, the patient was recommended for transthoracic needle biopsy (TTNB) rather than endobronchial ultrasound bronchoscopy (EBUS), which he denied and was discharged upon his request.

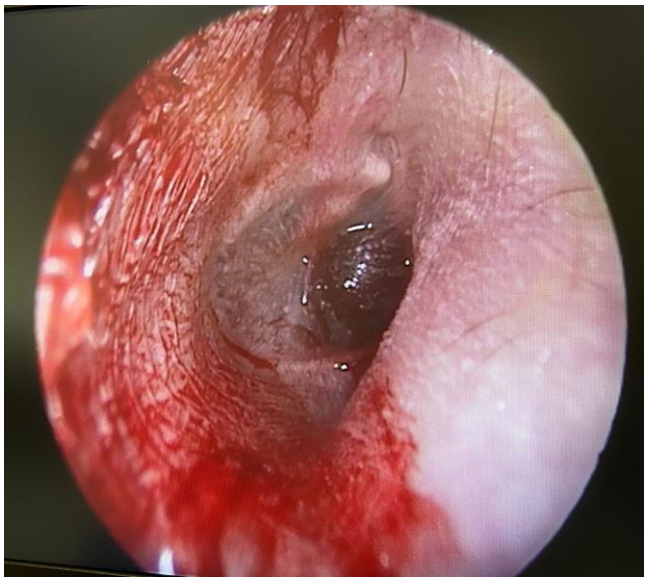

Figure 1: Otoscopic evaluation of the right tympanic membrane with a hemotympanum

Table 1: Common Characteristics of Reported Cases with Hemotympanum Related to Bronchoscopy

Reference	Year	No. of Patients	Age	Gender	Procedure	Sedation	Complication	Possible risk factors
Bhardwaj H et al.	2016	1	72	Male	Diagnostic Bronchoscopy	Moderate sedation and topical lidocaine	Bilateral HT and reversible hearing deficit, supportive care	Excessive Cough
Maqsood U et al.	2018	1	64	Male	EBUS-TBNA	Midazolam, alfentanil and topical lidocaine	Self-limited Bilateral HT	Aspirin and Cough
Hussain H et al.	2020	1	53	Female	EBUS and Biopsy	Propofol, midazolam and topical lidocaine	Right ear HT, supportive care	Cough

Abbreviations: EBUS: endobronchial ultrasound bronchoscopy; TBNA: transbronchial needle aspiration; HT: Hemotympanum

DISCUSSION

We report here a very unusual complication of a bronchoscopy procedure in which a male patient experienced right hemotympanum, referring to the presence of blood in the middle ear that accumulates and gives the tympanic membrane a bluish or black color, depending on the time of the bleeding (3). The condition may sometimes be accompanied by tympanic membrane perforation, thus resulting in bleeding observable from the outer ear canal. Previous studies in literature have reported hemotympanum occurring due to trauma, especially head trauma, epistaxis or chronic otitis media (4). The presence of any bleeding disorder or the usage of anticoagulant drugs may also play a role in spontaneously occurring forms of hemotympanum, while barotrauma is another risk factor for hemotympanum. Cases have been reported in scuba divers and following air travel, although sneezing and excessive cough may also increase middle ear pressure, and thus may also be a predisposing factor for hemotympanum (5). Bronchoscopy procedures are used mainly for the visualization of the airways, and to sample pulmonary lesions within the bronchial system. While the procedure is usually safe, many complications have been reported that are mainly classified as either mechanical or systemic. Mechanical complications are related to airway manipulations or bleeding, whereas systemic complications arise from the procedure itself, medication administration (sedation) or patient comorbidities (1,2). The most common complications of bronchoscopy are bronchospasm, laryngospasm, hypoxemia, elevated airway or intracranial pressure, hemorrhage, aspiration, arrhythmia and pulmonary insufficiency, although death may occur in less than 0.1% of cases (1,2). A review of literature revealed only three cases of hemotympanum developing as a complication of bronchoscopy (Table 1) (5–7). Due to the rarity of the condition there is insufficient knowledge to support a discussion of the underlying pathophysiology, and so literature would benefit from further case reports contributing to the identification of the risk factors and the development of avoidance measures.

The first reported case, published in 2016, described a male with bilateral hemotympanum during a diagnostic bronchoscopy without any sampling and without any risk factor despite excessive coughing (5). The second case was published in 2018, and described a male on aspirin in whom bilateral hemotympanum developed during EBUS with transbronchial needle aspiration (TBNA), with cough identified as the main risk factor for the complication (6). The most recent case was reported in 2020 by Hussain H et al. who described a female patient who developed right ear hemotympanum after EBUS and the taking of a biopsy (7). Barotrauma in the middle ear due primarily to excessive cough was described as responsible in all three cases. Our case had undergone a myringotomy intervention during childhood, which may have been an additional risk factor, together with the pronounced cough during bronchoscopy. Coughing is encountered quite often during diagnostic and interventional bronchoscopy procedures, but not all the patients with a persistent cough have a history of hemotympanum, and so additional risk factors most probably exist that predispose a certain specific group of patients to this complication, such as aspirin usage, for example, as in one the above cases. Fortunately, all the cases had self-limiting bleeding and reversible side effects that were cured with supportive care (5–7). Observation and conservative management may be sufficient in most cases, while more severe cases may require drainage of the blood or surgical intervention.

Another important issue to be discussed is the amount and type of sedation that should be used to suppress the cough in such patients. All the cases had been moderately sedated with midazolam, and some were given propofol or alfentanil together with topical lidocaine (6,7). While these drugs are sufficient for most patients, they might not be enough to suppress cough in others, and so new strategies for cough suppression should be developed to avoid cough-related complications.

CONCLUSION

This case report draws attention to a very rare complication in the form of hemotympanum occurring during a bronchoscopy procedure. While self-limited and reverse side effects have been reported, there is still a lack of data regarding the pathophysiology and risk factors associated with the condition, and the measures that can be taken to prevent such complications.

CONFLICTS OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Concept - D.E., P.N.; Planning and Design - D.E., P.N.; Supervision - D.E., P.N.; Funding -; Materials - D.E., P.N.; Data Collection and/or Processing - D.E., P.N.; Analysis and/or Interpretation - D.E.; Literature Review - D.E., P.N.; Writing - D.E., P.N.; Critical Review - D.E.

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