Research Article

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In Shortly about Shortness of Breath

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ABSTRACT

Shortness of breath is an uncomfortable feeling of lack of breathing air. Shortness of breath can occur while walking, climbing stairs, running, and even while sitting or lying down. Shortness of breath is a common symptom that can be associated with serious illness or can occur as a symptom if a person is not in physical shape. In addition to other symptoms, it may indicate diseases such as: asthma, lung disease, anemia, heart disease, etc. Frequent occurrence requires clinical determination of the cause, and treatment is in accordance with the diagnosis.

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Introduction

The clinical history is a critical initial step in the evaluation [1]. As is the case in any interaction between individuals, this requires the physician to establish a relationship with the patient that facilitates the accurate verbal transmission of information. This is a two-way street. The patient must feel enabled to present his or her history both fully and accurately. The physician must be able to elicit such information and accurately interpret it without prejudgment or bias (either scientific or social). This is often called a patient-centered approach to the history.

Acquiring such interviewing skill is an early and essential part of the training of a medical student. To facilitate obtaining and recording an accurate, organized, patient history, a standard approach is generally used on an initial encounter, although it may be modified on subsequent visits. This is often considered to be the center of the patient-physician encounter and consists of a body system-oriented, head to toe-review of all presenting symptoms in an organized manner. The review may disclose additional symptoms not initially reported by the patient that are important to the diagnosis.

A physician investigating the presenting symptom of back pain may elicit the additional symptom of pain on urination during the review, which suggests potential urinary tract disease. The experienced physician often will undertake this review as part of the physical examination.

Test Cycle

Surgical pathology is a laboratory discipline of testing that has a defined test cycle of preanalytic, analytic, and postanalytic [2]. Preanalytic and postanalytic challenges of specimen identification and processing as well as report generation and delivery are similar to processes that occur in clinical laboratories. The specimens in surgical pathology are unique and many times cannot be obtained

a second time as can be done with blood or urine specimens. The procedures to obtain surgical pathology specimens are also far more complex making it unpalatable to lose, mislabel, or mishandle a specimen.

Unique to surgical pathology is that the analytic phase of the test cycle is largely depended on pathologists' cognitive ability to interpret visual evidence and recognize disease. This adds to the complexity of the process but also offers potential solutions. It is the author's belief that the analytic phase of the test cycle is dependent on five factors:

1. The pathologist's knowledge, experience, and training,
2. Clinical correlation,
3. Use of ancillary confirmatory testing,
4. Use of standardized criteria for diagnosis and reporting standardized elements, and
5. Selectively reviewing cases to assure accuracy.

PTB

Patients who are suspected of having active PTB (Pulmonary tuberculosis) must have a posterior-anterior chest radiograph [3]. This is to reveal typical changes found in TB (tuberculosis), which classically includes enlarged hilar and mediastinal lymph nodes and mid- or upper-lobe consolidation or cavitation. At least three sputum samples should be sent for acid fast bacilli (AFB) TB microscopy and culture. In a positive microscopy test the TB bacillus displays a red stain resulting from its wall retaining the acid of the stain, thus called 'AcidFast'. If it is not possible to obtain spontaneously produced sputum, the patient should be referred for a bronchoscopy where the lungs are washed out in an attempt to find the bacillus. If respiratory samples come back negative but still have a high index of suspicion, immune-based tests could be performed. These include the Mantoux test or the more recent interferon gamma (IGRA) tests, and are a sign of previous exposure to TB. They are relatively non-specific and do not distinguish between active and past infection.

The gold standard for diagnosis is culturing the causative organism. This takes a long time, as the organism is slow growing. Historically this took up to 40 days of culture in specialized media, but newer systems have reduced this time, and culture may be positive within two weeks. Culture positivity is important in order to obtain antibiotic susceptibilities of the TB isolate. Molecular testing (PCR) can be performed looking for TB DNA in the sample; however, sensitivity is not high enough to rule out the diagnosis if a test is negative. Molecular testing does not provide full susceptibility results which are important for treatment.

Hyponatraemia

Hyponatraemia is defined as a serum sodium concentration of less than 135 mM [3]. It is a common problem, particularly in hospitalized patients, and is generally a secondary phenomenon to an underlying pathologic or physiologic process.

Plasma osmolality may be increased, normal, or decreased in hyponatraemia, and is reduced in the majority of cases. Hypertonic hyponatraemia arises when solutes in the extracellular fluid (as occurring with hyperglycaemia or with hypertonic mannitol infusion) draw water across from cells. Isotonic hyponatraemia usually arises with retention of isosmotic fluid in the extracellular space (e.g. isotonic glucose infusion), or when severe hyperlipidaemia or hyperproteinaemia reduces the fractional water content, leading to a 'pseudohyponatraemia'.

Hypotonic hyponatraemia is most common. This may be in the presence of a reduced, normal or increased extracellular fluid volume. Hypovolaemic hyponatraemia is caused by sodium depletion, either by renal or extra-renal means. Hypervolaemic hyponatraemia occurs with retention of sodium and water, which is due to activation of the renin-angiotensin-aldosterone axis secondary to heart failure, cirrhosis or nephrotic syndrome. In our case, fluid status appears normal, indicating the presence of euvoalaemic hyponatraemia. Here, sodium content is diluted by water excess, the causes of which include syndrome of inappropriate antidiuretic hormone (SIADH), hypothyroidism, and a reduced intake of solutes.

Sarcoidosis

The most common presentation is respiratory symptoms or abnormalities discovered on chest x-ray [4]. Bilateral hilar lymphadenopathy with lung mottling is a typical chest x-ray feature. Chest x-ray and computed tomography (CT) of the chest are likely to show involvement by the disease process. Lung function tests show a restrictive pattern of defect. Biopsy of the affected organs is likely to show noncaseating granulomas. These granulomas are composed of tightly clustered epithelioid cells, often with Langhans cells or foreign body giant cells. With chronic disease there is fibrosis.

Other microscopic features that may be present are the presence of Schaumann bodies (laminated concretions of calcium and protein) and that of asteroid bodies (stellate inclusions in giant cells). As the histology of granulomas caused by infectious diseases may be similar, special stains should be used to exclude them. These stains are typically acid-fast bacillus (AFB) to rule out Mycobacteria and Gomori methenamine silver (GMS) to rule out fungi. Serum angiotensin-converting enzyme (ACE) levels usually are elevated with this condition.

Anaphylactic Shock

Anaphylactic shock is a life-threatening, severe, systemic response to an allergen to which the body was previously sensitized [5].

Anaphylactic shock following a bee sting in a person sensitized to bee venom is a typical example. Allergy to various nuts, especially peanuts, is yet another wellknown cause. Drug induced anaphylactic reaction is most often related to administration of penicillin, but it can occur occasionally after intravenous injection of other drugs, anesthetics, or radiographic contrast media.

Shock develops as a result of a massive release of histamine and other vasoactive substances into the circulation. Typical symptoms include stridor (high-pitched sound during breathing) caused by vocal cord spasm, choking secondary to laryngeal edema and narrowing, wheezing and shortness of breath resulting from bronchial spasm, and pulmonary edema and systemic circulatory collapse with fainting caused by hypotension, secondary to vasodilation and increased leakage of fluid from the hyperpermeable blood vessels.

Fibrosis of the Lungs

It is helpful to visualize fibrosis of the lungs as it occurs among asbestos workers as the slow growth of fibrous tissue (scar tissue) between the air cells of the lungs wherever the inhaled dust comes to rest [6]. While new fibrous tissue is being laid down like a spider's web, that deposited earlier gradually contracts. This fibrous tissue is not only useless as a substitute for the air cells, but with continued inhalation of the causative dust, by its invasion of new territory and consolidation of that already occupied, it gradually, and literally strangles the essential tissues of the lungs.

In common with other essential organs of the body the lungs have a large reserve of tissue for use in emergencies and to permit of a diminution in functional capacity due to advancing age or disease. For this reason, and because fibrosis of the lungs is essentially a local disease, it is only when the fibrosis progresses to the extent of obliterating this reserve, that undue shortness of breath on any extra effort draws the worker's attention to the fact that his health is not what it should be. The other symptoms of the disease such as cough are equally unassuming, and are readily ascribed to some common and trivial cause.

From this point the progress of the disease is more rapid, since it is now encroaching on the remaining sound tissue of the lungs, already only just sufficient to maintain him in his ordinary daily activities. Ultimately, if no acute respiratory infection has precipitated a fatal termination, a stage is reached when the lungs can do little more than maintain life, and the shortness of breath becomes extreme.

Coronavirus

Coronaviruses are ribonucleic acid (RNA) viruses that received their name from the crownlike spikes projecting from the viruses as seen by electron microscopy (corona = crown) [1]. There are three major groups of coronaviruses that cause disease in animals and humans. Previously, most of the infections in humans caused by coronaviruses were common colds, not lower respiratory tract infections.

The SARS (severe acute respiratory syndrome) and MERS (Middle Eastern respiratory syndrome) associated viruses, however, are unique in that they are the first ones known to cause severe, potentially lethal disease in people. Precautions to prevent infection when dealing with patients include gloves, gowns, masks, and eye protection.

The illness begins with chills and fever, sometimes mild respiratory symptoms, and occasionally diarrhea. After three to seven days,

manifestations of lower respiratory tract infection appear: cough, shortness of breath, and evidence of pneumonia demonstrated by chest x-ray examination.

The severity of the illness is quite variable. The lungs of severely affected patients show the characteristic features of adult respiratory distress syndrome, and patients require mechanical ventilation using an increased oxygen concentration to improve the diffusion of oxygen across the thickened edematous alveolar septa, as well as other measures to improve pulmonary function. Although current cases in the recent outbreak of MERS are a result of human-to-human spread, animal reservoirs for the virus are likely. The disease started in the Middle East and has spread to Korea. Bats and camels are suspected to harbor the MERS virus; bats, civet cats, and possibly other small mammals harbor SARS.

Conclusion

The causes of shortness of breath are mainly heart and lung diseases. The heart and lungs are involved in transporting oxygen through the body and expelling carbon dioxide, and problems with any of these processes affect breathing. Breathing is regulated by the brain, and it is also affected by the complex interactions of various chemicals and gases in the blood and air that is inhaled. Oxygen and carbon dioxide levels, as well as the amount of hemoglobin in the blood, also play an important role in regulating respiration.

References

1. Reisner E G, Reisner H M (2017) Crowley's An Introduction To Human Disease - Pathology and Pathophysiology Correlations, Tenth Edition“, Jones & Bartlett Learning, LLC, Burlington, USA 4: 397-398.
2. Nakhleh R E (2015) Introduction“ in Nakhleh, R. E. (ed): „Error Reduction and Prevention in Surgical Pathology“, Springer Science+Business Media, New York, USA 1-2.
3. Shamil E, Ravi P, Chandra A (2014) 100 Cases in Clinical Pathology“, CRC Press, Taylor & Francis Group, Boca Raton, USA 10: 328-329.
4. Toy E C, Uthman M O, Uthman E, Brown E J (2008) Case Files - Pathology, Second Edition“, The McGraw-Hill Companies, Inc., New York, USA 199.
5. Damjanov I (2017) Pathology for the Health Professions“, Elsevier Inc., St. Louis, USA 52.
6. Motley L R, Patrick jr C W, McGinness Kearse A, Roggli V L, Oury T D, et al (2004) Medicolegal Aspects of Asbestos-Related Diseases: A Plaintiff's Attorney's Perspective Pathology of Asbestos-Associated Diseases, Second Edition, Springer-Verlag, New York, USA 355-356.

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