

Chapter 1 : Diagnosis and Assessment of Interstitial Lung Disease - Insights in IPF

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This article has been cited by other articles in PMC. To explore the associations between decreased pulse oximetry values SpO₂ and clinical, laboratory, and demographic variables in general practice patients diagnosed with asthma or chronic obstructive pulmonary disease COPD, including those with both COPD and asthma in combination. The patients were examined during a stable phase of their disease. Of patients included mean age Pulse oximetry represents a useful diagnostic adjunct for assessing the severity of obstructive pulmonary disease. Key Points Despite its common use in general practice, the diagnostic benefits of pulse oximetry remain to be established. Decreased pulse oximetry values are associated with both reduced lung function spirometry and with a diagnosis of coronary heart disease. Pulse oximetry may therefore be a useful measure in the follow-up of asthma and COPD patients in general practice. Asthma, chronic obstructive pulmonary disease, comorbidity, general practice, Norway, oximetry Introduction Pulse oximetry is a non-invasive, simple, inexpensive, and rapid test to estimate haemoglobin oxygen saturation. Hand-held pulse oximeters have become available in general practice and have been reported to be useful diagnostic tools for the assessment of chronic obstructive pulmonary disease COPD during both stable phase [1, 2] and exacerbations [1, 3], and in particular for confirming the need for oxygen therapy [1, 4, 5]. Pulse oximetry may also be helpful in assessing the severity of asthma exacerbations [1, 6]. More evidence of the usefulness of pulse oximetry is urgently needed, because its use is rapidly increasing in general practice [1, 11, 12]. GPs implementing pulse oximetry should be able to explain to patients the implications of a lower-than-normal SpO₂ value. The aim of this study was to describe conditions and patient characteristics associated with decreased pulse oximetry values in primary care patients with stable obstructive lung disease. Material and methods The study was carried out at seven Norwegian GP group practices. The practices were not randomly selected, but were chosen based on the availability of spirometry results from the previous five years and the type of electronic medical record system used. For reasons of feasibility e. A total of patients were invited to participate, and in all the practices these were randomly selected in alphabetical order among the eligible patients. Invitations were sent by surface mail without additional reminders. Participation required completion of a questionnaire, a meeting during a stable phase of their disease for a clinical examination including spirometry i. This report is based on the baseline examinations, which took place between March and March The participants were instructed not to take their regular respiratory medication on the day of the examination. On a separate questionnaire, patients recorded their smoking habits. The highest value obtained from three measurements was recorded. The thresholds for raised values were based on the reference values used at the University Hospital of North Norway. The upper normal limit was During spirometry, the patients were seated and a nose clip was not used. Post-bronchodilator spirometry was carried out 20 min after inhalation of 0. The post-bronchodilator forced expiratory volume in one second FEV₁ and forced vital capacity FVC were used in the analyses. Norwegian reference values for spirometry were applied [14]. Patients who were given both diagnoses were allocated to the COPD group. The significance of associations between reduced SpO₂ and patient characteristics was analysed using the chi-square test. The multivariable analysis was also performed without categorizing the continuous variables.

Chapter 2 : A Practical Guide to Clinical Medicine

Assessment of patients with chronic obstructive pulmonary disease (COPD) is important to establish an accurate diagnosis, assist in making therapeutic decisions, measuring outcomes for clinical and research purposes, and determining prognosis.

Palpation plays a relatively minor role in the examination of the normal chest as the structure of interest the lung is covered by the ribs and therefore not palpable. Specific situations where it may be helpful include:

Accentuating normal chest excursion: Remember to first rub your hands together so that they are not too cold prior to touching the patient. Your hands should lift symmetrically outward when the patient takes a deep breath. Processes that lead to asymmetric lung expansion, as might occur when anything fills the pleural space e. There has to be a lot of pleural disease before this asymmetry can be identified on exam.

Detecting Chest Excursion Tactile Fremitus: Normal lung transmits a palpable vibratory sensation to the chest wall. This is referred to as fremitus and can be detected by placing the ulnar aspects of both hands firmly against either side of the chest while the patient says the words "Ninety-Nine. The bony aspects of the hands are used as they are particularly sensitive for detecting these vibrations. Assessing Fremitus Pathologic conditions will alter fremitus. Consolidation occurs when the normally air filled lung parenchyma becomes engorged with fluid or tissue, most commonly in the setting of pneumonia. If a large enough segment of parenchyma is involved, it can alter the transmission of air and sound. In the presence of consolidation, fremitus becomes more pronounced. Fluid, known as a pleural effusion, can collect in the potential space that exists between the lung and the chest wall, displacing the lung upwards. Fremitus over an effusion will be decreased. In general, fremitus is a pretty subtle finding and should not be thought of as the primary means of identifying either consolidation or pleural fluid. It can, however, lend supporting evidence if other findings see below suggest the presence of either of these processes. Effusions and infiltrates can perhaps be more easily understood using a sponge to represent the lung. In this model, an infiltrate is depicted by the blue coloration that has invaded the sponge itself sponge on left. An effusion is depicted by the blue fluid upon which the lung is floating sponge on right. If the patient complains of pain at a particular site it is obviously important to carefully palpate around that area. In addition, special situations e. This technique makes use of the fact that striking a surface which covers an air-filled structure e. If the normal, air-filled tissue has been displaced by fluid e. Alternatively, processes that lead to chronic e. Initially, you will find that this skill is a bit awkward to perform. Allow your hand to swing freely at the wrist, hammering your finger onto the target at the bottom of the down stroke. A stiff wrist forces you to push your finger into the target which will not elicit the correct sound. In addition, it takes a while to develop an ear for what is resonant and what is not. A few things to remember: Ask the patient to cross their hands in front of their chest, grasping the opposite shoulder with each hand. This will help to pull the scapulae laterally, away from the percussion field. Work down the "alley" that exists between the scapula and vertebral column, which should help you avoid percussing over bone. Try to focus on striking the distal inter-phalangeal joint i. The impact should be crisp so you may want to cut your nails to keep blood-letting to a minimum! Try to keep the remainder of your fingers from touching the patient, or rest only the tips on them if this is otherwise too awkward, in order to minimize any dampening of the percussion notes. Then move your hand down several inter-spaces and repeat the maneuver. In general, percussion in 5 or so different locations should cover one hemi-thorax. After you have percussed the left chest, move yours hands across and repeat the same procedure on the right side. In this way, one thorax serves as a control for the other. In general, percussion is limited to the posterior lung fields. However, if auscultation see below reveals an abnormality in the anterior or lateral fields, percussion over these areas can help identify its cause.

Percussion Technique The goal is to recognize that at some point as you move down towards the base of the lungs, the quality of the sound changes. This normally occurs when you leave the thorax. It is not particularly important to identify the exact location of the diaphragm, though if you are able to note a difference in level between maximum inspiration and expiration, all the better. Ultimately, you will develop a sense of where the normal lung should end by simply looking at the chest. The exact vertebral level at which

this occurs is not really relevant. During this technique, the examiner moves their left i. This tends to make the point of inflection i. Try finding your own stomach bubble, which should be around the left costal margin. Note that due to the location of the heart, tapping over your left chest will produce a different sound than when performed over your right. Tap on tupperware filled with various amounts of water. This not only helps you develop a sense of the different tones that may be produced but also allows you to practice the technique. Prior to listening over any one area of the chest, remind yourself which lobe of the lung is heard best in that region: This can be quite helpful in trying to pin down the location of pathologic processes that may be restricted by anatomic boundaries e. Many disease processes e. Put on your stethoscope so that the ear pieces are directed away from you. Adjust the head of the scope so that the diaphragm is engaged. If not, twist the head and try again. The upper aspect of the posterior fields i. Listen over one spot and then move the stethoscope to the same position on the opposite side and repeat. This again makes use of one lung as a source of comparison for the other. The entire posterior chest can be covered by listening in roughly 4 places on each side. Lung Auscultation The lingula and right middle lobes can be examined while you are still standing behind the patient. Then, move around to the front and listen to the anterior fields in the same fashion. This is generally done while the patient is still sitting upright. Asking female patients to lie down will allow their breasts to fall away laterally, which may make this part of the examination easier. There are several sources of tension relating to the physical exam in general, which are really brought to the fore during the chest examine. Keys to performing a sensitive yet thorough exam: For lung exam, you can listen to the anterior fields by exposing only the top part of the breasts see picture below. Ask the patient to take slow, deep breaths through their mouths while you are performing your exam. This forces the patient to move greater volumes of air with each breath, increasing the duration, intensity, and thus detectability of any abnormal breath sounds that might be present. This clears airway secretions and opens small atelectatic i. If the patient cannot sit up e. Get help if the patient is unable to move on their own. Requesting that the patient exhale forcibly will occasionally help to accentuate abnormal breath sounds in particular, wheezing that might not be heard when they are breathing at normal flow rates. What can you expect to hear? A few basic sounds to listen for: A healthy individual breathing through their mouth at normal tidal volumes produces a soft inspiratory sound as air rushes into the lungs, with little noise produced on expiration. These are referred to as vesicular breath sounds. As this most commonly occurs in association with diffuse processes that affect all lobes of the lung e. In cases of significant bronchoconstriction, the expiratory phase of respiration relative to inspiration becomes noticeably prolonged. Clinicians refer to this as a decrease in the I to E ratio. The greater the obstruction, the longer expiration is relative to inspiration. Occasionally, focal wheezing can occur when airway narrowing is restricted to a single anatomic area, as might occur with an obstructing tumor or bronchoconstriction induced by pneumonia. This may be best appreciated by placing your stethoscope directly on top of the trachea. The sound is similar to that produced by rubbing strands of hair together close to your ear. Pulmonary edema is probably the most common cause, at least in the older adult population, and results in symmetric findings. This tends to occur first in the most dependent portions of the lower lobes and extend from the bases towards the apices as disease progresses. Pneumonia, on the other hand, can result in discrete areas of alveolar filling, and therefore produce crackles restricted to a specific region of the lung. Very distinct, diffuse, dry-sounding crackles, similar to the noise produced when separating pieces of velcro, are caused by pulmonary fibrosis, a relatively uncommon condition. Dense consolidation of the lung parenchyma, as can occur with pneumonia, results in the transmission of large airway noises i. In this setting, the consolidated lung acts as a terrific conducting medium, transferring central sounds directly to the edges. These noises are referred to as ronchi. Auscultation over a pleural effusion will produce a very muffled sound. If, however, you listen carefully to the region on top of the effusion, you may hear sounds suggestive of consolidation, originating from lung which is compressed by the fluid pushing up from below. Asymmetric effusions are probably easier to detect as they will produce different findings on examination of either side of the chest.

Chapter 3 : Should pulse oximetry be included in GPsâ€™™ assessment of patients with obstructive lung disease

Conclusion. Pulse oximetry represents a useful diagnostic adjunct for assessing the severity of obstructive pulmonary disease. Decreased pulse oximetry values in stable-phase patients with asthma and/or COPD should prompt the GP to consider revising the diagnosis and treatment and to look for co-morbidities.

Mortality for COPD has been increasing ever since while other diseases have decreasing mortalities. COPD also account for the death of , Americans every year. An additional 2 million may have COPD but remain undiagnosed. Prolonged and intense exposure to occupational dust and chemicals, indoor air pollution, and outdoor air pollution all contribute to the development of COPD. The well-documented genetic risk factor is a deficiency of alpha1- antitrypsin, an enzyme inhibitor that protects the lung parenchyma from injury. Chronic cough is one of the primary symptoms of COPD. There is a hyperstimulation of the goblet cells and the mucus-secreting gland leading to overproduction of sputum. Dyspnea is usually progressive, persistent, and worsens with exercise. As COPD progress, dyspnea at rest may occur. Dyspnea interferes with eating and the work of breathing is energy depleting. In patients with emphysema, barrel chest thorax configuration results from a more fixed position of the ribs in the inspiratory position and from loss of elasticity. Discipline and consistency are the keys to achieving freedom from chronic pulmonary diseases. This is the single most cost-effective intervention to reduce the risk of developing COPD and to stop its progression. The acuity and the onset of respiratory failure depend on baseline pulmonary function, pulse oximetry or arterial blood gas values, comorbid conditions, and the severity of other complications of COPD. This can be acute or chronic, and may necessitate ventilator support until other acute complications can be treated. Assessment and Diagnostic Findings Diagnosis and assessment of COPD must be done carefully since the three main symptoms are common among chronic pulmonary disorders. The nurse should obtain a thorough health history from patients with known or potential COPD. Pulmonary function studies are used to help confirm the diagnosis of COPD, determine disease severity, and monitor disease progression. Spirometry is used to evaluate airway obstruction, which is determined by the ratio of FEV1 to forced vital capacity. Arterial blood gas measurement is used to assess baseline oxygenation and gas exchange and is especially important in advanced COPD. A chest x-ray may be obtained to exclude alternative diagnoses. Computed tomography chest scan may help in the differential diagnosis. Screening for alpha1-antitrypsin deficiency. Screening can be performed for patients younger than 45 years old and for those with a strong family history of COPD. Done to determine cause of dyspnea, whether functional abnormality is obstructive or restrictive, to estimate degree of dysfunction and to evaluate effects of therapy, e. May be increased, indicating air-trapping. Arterial blood gases ABGs: Determines degree and severity of disease process, e. Assesses diffusion in lungs. Carbon monoxide is used to measure gas diffusion across the alveocapillary membrane. Because carbon monoxide combines with hemoglobin times more easily than oxygen, it easily affects the alveoli and small airways where gas exchange occurs. Emphysema is the only obstructive disease that causes diffusion dysfunction. Can show cylindrical dilation of bronchi on inspiration; bronchial collapse on forced expiration emphysema ; enlarged mucous ducts bronchitis. COPD is characterized by a mismatch of perfusion and ventilation i. Complete blood count CBC and differential: Determines presence of infection , identifies pathogen. Rules out underlying malignancy or allergic disorder. Exercise ECG, stress test: Medical Management Healthcare providers perform medical management by considering the assessment data first and matching the appropriate intervention to the existing manifestation. Bronchodilators relieve bronchospasm by altering the smooth muscle tone and reduce airway obstruction by allowing increased oxygen distribution throughout the lungs and improving alveolar ventilation. A short trial course of oral corticosteroids may be prescribed for patients to determine whether pulmonary function improves and symptoms decrease. Other pharmacologic treatments that may be used in COPD include alpha1-antitrypsin augmentation therapy, antibiotic agents, mucolytic agents, antitussive agents, vasodilators , and narcotics. Management of Exacerbations Optimization of bronchodilator medications is first-line therapy and involves identifying the best medications or combinations of medications taken on a regular schedule for a specific patient. Indications for hospitalization for acute

exacerbation of COPD include severe dyspnea that does not respond to initial therapy, confusion or lethargy, respiratory muscle fatigue, paradoxical chest wall movement, and peripheral edema. Upon arrival of the patient in the emergency room, supplemental oxygen therapy is administered and rapid assessment is performed to determine if the exacerbation is life-threatening. Antibiotics have been shown to be of some benefit to patients with increased dyspnea, increased sputum production, and increased sputum purulence. Bullectomy is a surgical option for select patients with bullous emphysema and can help reduce dyspnea and improve lung function. Lung Volume Reduction Surgery. Lung volume reduction surgery is a palliative surgery in patients with homogenous disease or disease that is focused in one area and not widespread throughout the lungs. Lung transplantation is a viable option for definitive surgical treatment of end-stage emphysema. Nursing Management Management of patients with COPD should be incorporated with teaching and improving the respiratory status of the patient. Nursing Assessment Assessment of the respiratory system should be done rapidly yet accurately. Assess the signs and symptoms of COPD and their severity. Assess breath sounds and pattern. Diagnosis Impaired gas exchange due to chronic inhalation of toxins. Ineffective airway clearance related to bronchoconstriction, increased mucus production, ineffective cough, and other complications.

Chapter 4 : Chronic Obstructive Pulmonary Disease (COPD) Nursing Care Management

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Here is a personal checklist that will enable you to determine whether you should consult your physician. Does COPD run in my family? Am I short of breath more than others? When I cough, do I cough up yellow or green mucus? History A careful history, with a focus on cough, expectoration, shortness of breath, wheeze, and the duration of these symptoms is basic. Most patients have had some telltale symptoms for years before they come to a doctor for an evaluation. None of these symptoms is specific or diagnostic by itself. Some common questions often asked by doctors or nurses to help evaluate the patient are listed in Tables 1 and 2. A complete physical examination should be performed during your first visit to a doctor. Questions a doctor may ask: How long have you had cough, shortness of breath, or wheeze? Have you seen many doctors for it? What are you now doing to treat it? How many days did you miss from work last year because of the lung problem? Were you in the hospital for it? How long and how many times last year? Describe your usual good day. Do you have more good days than bad days in a week? What are you able to do when you are feeling your very best? Who do you live with? What recreation do you prefer? How does the emphysema or chronic bronchitis bother you? When does it bother you the most? What have you learned to do that helps you to live with it? Does it ever embarrass you to have lung trouble? Your physician will thoroughly examine your chest, observe your breathing patterns, and perhaps monitor how hard you are working to breathe. He or she will note the degree of over-inflation by percussion tapping over the lungs. He will listen to your chest with a stethoscope to hear the air flow in and out of your lungs. The intensity loudness of the sounds is helpful. Noises caused by mucus or inflammation are also noted. The physician or nurse will also listen to your heart sounds to determine the rate and rhythm of your heart and any signs of heart strain that may accompany advanced stages of COPD. The examination itself is not very accurate in determining the severity of the abnormality, however. A physical examination may be normal even in the early stages of significant disease. This is because airflow abnormalities are usually moderately advanced before they can be detected with a stethoscope! By the time the x-ray is clearly indicative of the disease, the neighbors usually know the diagnosis! However, the x-ray may show over-inflation of the lungs, which is common in emphysema. X-rays are also valuable in finding other abnormalities such as shadows which may indicate coexisting lung cancer. Lung cancer and COPD often occur together because both are caused by smoking. The heart and the large vessels to and from the heart can also be seen on a chest x-ray and give some indication about associated heart strain, but only in advanced stages of disease. However, the chest x-ray can be completely normal, even when the patient has a significant degree of COPD. The x-ray, though traditional, is not a good way of diagnosing or evaluating COPD. In very advanced disease, EKG abnormalities are usually evidence of strain in the right side of the heart, i. The common bacteria are well-known, and today physicians properly prescribe antibiotics based on their knowledge of the most common organisms and will do so if sputum increases in volume and becomes colored. Yellow or greenish sputum is almost always infected and requires antibiotics. Measuring Lung Capacity A simple device called a spirometer measures your lung capacity. During this test you take a deep breath, as deeply as you can, and blow it out all at once into a machine that records airflow and capacity. The total amount of air blown out of fully inflated lungs is called the vital capacity. This test measures the useful size of your lungs. The rate of airflow tells how open the air passages are and how well the lungs can empty, or how well their elasticity is functioning. The lungs empty somewhat like an inflated balloon. Remember how a flabby or overused balloon empties slowly and incompletely? This is a lot like the lung with emphysema. The airflow test is called the forced expiratory volume in one second, since this airflow is timed or measured over the first second of exhalation. The symbol for forced expiratory volume in one second is FEV1. These two numbers are somewhat similar to systolic and diastolic numbers in blood pressure readings. We believe that knowledge of FVC and FEV1 is as valuable and important to health promotion as knowledge of blood pressure. These tests measure your lung power, which is essential to your continuation and enjoyment of life.

Normal values are based on age, sex, and height. Younger and taller individuals have greater airflow and air volume than shorter or older people. Men have slightly greater airflow and air volume compared with women of the same age and height. Self-Testing- Try It Yourself Normal lungs have large volume, and they empty quickly because airways are open and lungs are elastic. You can do a little checking yourself with a stopwatch. Take a full breath; hold it for one second. Then, with your mouth open, blow out as hard and fast as you can. Your lungs should be completely emptied " meaning that you can blow no more air out even though you try" in no more than 4 to 6 seconds. If one takes longer to blow out all the air, it means that airflow is obstructed or limited. See how simple it is! Unfortunately, routine lung function tests have been accepted all too slowly. No person would go for a complete check-up if the physician did not examine the eyes, ears, nose, throat, listen to the heart and lungs, feel the abdomen for any abnormal masses, and examine the genital, rectal, and pelvic areas. All these are routine, and to supplement them, appropriate laboratory blood and urine tests are done, plus an electrocardiogram and, usually, a chest x-ray. Unfortunately, none of these examinations or tests identifies early COPD. Only spirometric measurements of the kind we have just described can identify the patient who is just beginning to develop a lung abnormality. The answer must be yes if you are to enjoy a long happy life. Very simple devices for measuring lung capacity are becoming popular. One such device is called a peak flow meter, which measures the greatest airflow rate you can produce. The lower value for women is because of their shorter stature and female sex. Some physicians instruct their patients to use peak flow meters at home to study the response to treatments designed to open up their air passages. Another new device called a spirometer accurately measures forced vital capacity. These measurements of both volume capacity forced vital capacity and flow can give a good estimate of the mechanical function of the lungs. Newer, less expensive pulmonary function testing equipment is now readily available for use in primary care physician offices. One such test is the blood gas measurement. A small amount of blood is drawn from an artery by a small needle and syringe. This blood is analyzed to measure the amount of oxygen and carbon dioxide it contains. This test is used to assess more advanced stages of emphysema and chronic bronchitis and is needed when the physician is considering prescribing oxygen and in cases of serious and emergency illness. Another simple method of measuring blood oxygen is with an instrument called an oximeter which is widely used today. It is popular because it does not require arterial blood sampling. However, it is not as accurate as arterial blood measurement, and it tells nothing about the levels of carbon dioxide or acid pH in the blood. The pulse oximeter measures blood oxygen by reflected light. This test is easy and painless and will be much more widely used in the future. Additional lung function tests such as the diffusion test also measure the integrity of the air-blood interface, or alveolar capillary membrane. Numerous additional tests are used for research purposes, but they do not have any practical value at the present time. In summary, adequate evaluation of patients with all stages of COPD is within the reach of all doctors and their patients. The approach is simple and straightforward. All patients with shortness of breath, cough, wheeze " particularly those with family history of COPD and absolutely all smokers " should insist on this crucial evaluation. Make a Donation Your contributions can help us reach our financial goals. Travel Information Be better prepared for any health emergencies on your next trip.