

Cardiac Examination and Preventing Cardiovascular Disease

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Abstract:

Symptoms such as fatigue, shortness of breath, pressure and chest pain, skipping or heart beating, swelling of the legs or a heart murmur are reasons to visit a cardiologist. Cardiac examination is also intended for people who have an enlarged heart shadow on an X-ray of the heart or changes in an outpatient ECG that may indicate heart disease, and who have not yet undergone cardiac treatment. Cardiac examinations should be requested by people who are exposed to increased physical exertion such as athletes, people with risk factors for cardiovascular diseases such as high blood pressure, diabetes, smoking, high blood fat levels and people with a history of heart disease in close relatives at a younger age. People who have no signs or symptoms of heart disease but want to check the condition of the cardiovascular system as well.

Keywords: heart; heart condition; cardiology; medical examination; patient; health

Introduction:

Practitioners perceive the empirical knowledge cumulatively produced by science through examination of ever-smaller components of the body as evolving toward truth [1]. For medical professionals, this reductionist knowledge becomes the only objective and rational way to understand the body, its illnesses, and its healing processes. (In human health and disease, there are not any ultimate mysteries of the kind that may require theological explanation. Laypeople might see certain mysterious varieties of suffering or processes of healing as evidence of divine action; for medicine, these are simply realms within which scientific discovery lies within the future, not the past.) Human suffering can best be understood by a deep knowledge of the body as an intricate and sophisticated piece of machinery, one profoundly influenced by (yet somehow separate from) the mind. A malfunction of the smallest part—a gene, a protein, a cell membrane receptor—may have devastating effects. Clinicians analyze illness by disaggregating the individual into a group of organs or molecules, and health by breaking down people or societies into assemblages of risk factors. In other words, medical knowledge is secular, mechanistic, materialist, reductionist, and Cartesian.

As the 21st century commences, the aged constitutes a growing proportion of the world's population [2]. This growth is happening in America at unprecedented rates. The "graying" of America could be a popular expression describing the phenomenon of a uniformly aging population. The upward trend within the growth of America's elders promises to possess a big impact socially, economically, and culturally, particularly by 2030, when the country's cohort of baby boomers will reach the age of 85 and over.

According to the US Bureau of the Census, from the start of the 20th century to its close, the percentage of the US population comprised by seniors over the age of 65 has increased from 3.1 million people to 34.1 million. The oldest old, those above the age of 80, have also experienced an astounding population explosion, increasing from 4% of the population in 1900 to 10% in 1990. This proportion is anticipated to exceed 13% by the year 2050. This burgeoning of elderly individuals has and can continue to increase the demand for more assisted-living facilities, improved long-term-care program options, broader health maintenance organization (HMO) coverage, and more stringent social insurance safeguarding.

The graying of the industrialized world results from an interplay of two independent



trends. the first of those trends could be a sharp decline in overall mortality. The decrease in mortality represents the result that a lot of years of intense public health measures to reduce all-cause mortality, particularly the incidence of infectious disease and associated mortality. Second, in many industrialized countries, the birth rate has also declined dramatically. Having multiple children may be a trend that has lost popularity in developed nations for various socioeconomic and cultural reasons. The developing world, in contrast, continues to boast a really high birth rate, as children are often considered an economic resource and source of livelihood for many families. Additionally, infant and child mortality rates are exceedingly high in developing nations, increasing the rationale for birthing multiple children.

In less industrialized countries the demographic picture historically has exhibited a high proportion of national populations under the age of 15 and a paucity of seniors over the age of 65. High case-fatality rates from diseases of infectious and other etiologies persist in the developing world but are starting to decline as industrialization, improved medical technology, and delivery systems permeate these societies. As a result, developing populations are expected to undergo demographic transition, a trend marked by declining death rate and birth rate that may ultimately cause a decrease in population size.

Clinical Examination:

A clinical examination is performed to search out clinical signs, the positive and objective findings that demonstrate the presence of disease [3]. The art is in determining which positive findings are relevant for the particular patient, because multiple signs and thus pathologies commonly coexist. A stepwise and systematic routine is important, which is exclusive to the examiner, but it should be the identical for any given system to make sure that nothing is missed. At first, the routine seems formulaic. However, over time it becomes second nature and adaptable to every individual focused examination.

The cardiovascular examination includes the lower limbs and therefore the abdomen. Examination of those areas provides clues on the presence and severity of other diagnoses.

Patient Profile:

Characterizing the profile of the patient constitutes a key element for therapeutic decision-making [4]. In HF (Heart failure) the patients is classified per clinical characteristics, precipitating factors, physical examination findings, and ejection fraction.

Classifying patients by systolic blood pressure (SBP) at presentation (hypertensive, normotensive, or hypotensive) may be a strong predictor of outcome, particularly mortality, while it also guides the initial therapeutic decisions (i.e., inotropes vasopressors in hypotensive AHF (Acute heart failure) or vasodilators in hypertensive AHF).

Another approach is to classify patients according to the presence of the following precipitants/causes resulting in decompensation, which require to be treated/ corrected urgently: ACS (acute coronary syndrome), hypertensive emergency, rapid arrhythmias or severe bradycardia/conduction disturbance, acute mechanical

cause underlying AHF, or submassive or massive pulmonary embolism.

Bedside physical examination can help classify patients based on symptoms/signs of congestion (“wet” vs. “dry” if present vs. absent) and/or peripheral hypoperfusion (“cold” vs. “warm” if present vs. absent). The mix of those options identifies four groups: (a) warm and wet (well perfused and congested) most typically present; (b) cold and wet (hypoperfused and congested); (c) cold and dry (hypoperfused without congestion); and (d) warm and dry (compensated, well perfused without congestion). This classification may be helpful to guide therapy within the initial phase and carries prognostic information.

Historically the measurement of LVEF (left ventricular ejection fraction) has been used to differentiate the wide range of patients with HF. This classification is important within the AHF setting because of their different underlying etiologies, demographics, and comorbidities, as well as different long-term oral medications. Patients that present with normal LVEF ($\geq 50\%$) are classified as HfpEF (HF with preserved ejection fraction), whereas those with reduced LVEF ($< 40\%$) as HfrEF (HF reduced ejection fraction). Patients with LVEF within the range of 40–49% represent a area, which we now define as HfmrEF (HF mid-range ejection fraction).

Patients with HF complicating no- or ST-elevation MI will be classified per Killip and Kimball into Class I, no clinical signs of HF; Class II, HF with rales and S3 gallop; Class III, with frank acute pulmonary edema; and class IV, cardiogenic shock and hypotension (SBP < 90 mmHg) and evidence of peripheral vasoconstriction like oliguria, cyanosis, and diaphoresis.

Medical History:

- Previous occurrence of angina, and if so the frequency and precipitators [5].
- Previous myocardial infarctions and treatments.
- Previous cardiac investigations like echocardiograms, perfusion scans and angiograms.
- Previous cardiac intervention like angioplasty or pacing devices.
- Previous cardiac surgery including coronary bypass surgery and valvular surgery.
- Congenital cardiac conditions.
- History of conditions that are risk factors for ischaemic heart disease like diabetes, hypertension and hypercholesterolaemia.
- History of conditions that are risk factors for infective endocarditis (e.g. recent dental work, invasive procedures like colonoscopy, and intravenous drug use).
- History of previous rheumatic fever (may result in valvular disease).
- Recent viral illness if pericarditis or myocarditis is suspected.
- Enquire about conditions like Marfan’s syndrome which can cause aortic root dilatation or aortic dissection.
- A history of stomach ulcers or severe gastritis may require caution within the use of anti-platelet medications, particularly aspirin.

Investigations:



- A brief physical examination should be performed, noting particularly [6]:
- Pulse and blood pressure.
- The presence or absence of peripheral pulses.
- Any evidence of pulmonary congestion (JVP, basal crackles).
- Results of recent blood tests should be available. As a minimum, this could include a blood count, assessment of electrolytes, renal function, and glucose.
- Lipid status should be documented.
- Anticoagulation status should be obtained in patients who have been taking warfarin.
- A 12-lead ECG should be performed prior to cardiac catheterization (to act as a baseline).
- Patients should have a venous cannula inserted for the administration of sedation, intravenous (IV) fluids, and emergency drugs (preferably within the left arm).

Home:

A classic coronary will present with severe central chest pain related to pallor and sweating [7]. This can make the diagnosis relatively easy. If the GP (General Practice) is called to see a patient like this he will usually have knowledge of the background of the patient (eg heavy smoker) and should, therefore, be ready to make the diagnosis within a matter of seconds. However, many myocardial infarctions present with a variety of pain from little or none to very severe, and therefore the GP must take a careful history from the patient as well as examine him and note any risk factors.

If he considers that the patient has had an acute myocardial infarction, his first action must be to give the patient an aspirin which should be chewed and swallowed quickly. This acts as a thrombolysing agent to dissolve the clot. His second action will be to summon help within the form of an ambulance. This might have already been done as many modern protocols include alerting an ambulance at the same time as a doctor is called to a patient with significant chest pain. If an ambulance has not been called, the patient's spouse or another person would need to help the doctor. Thirdly the doctor must afford pain relief. this could be through with morphine or one among its analogues which provides considerable relief of pain and a sense of well being. Most ambulances are going to be with the patient within 10–20 minutes and it's the doctor's responsibility to wait with the patient until the ambulance arrives, although it's not necessary for the doctor to accompany the patient to hospital.

Modern trials don't indicate that thrombolysis has a significant benefit if given by the GP at home unless the hospital may be a ways from the patient's house. it's unlikely, therefore, that within the next few years we shall see streptokinase or other thrombolytic being given at home. There has been a suggestion that each one GPs should have a defibrillator. Calculating from major trials, a GP would probably must deal with one cardiac arrest every three years, and it doesn't seem justified for him to possess a defibrillator for this rare occasion, especially when all resuscitative equipment arrives with the ambulance. The GP is expected to give adequate cardio-pulmonary resuscitation if necessary.

Penetrating Injury:

A injury is sometimes obvious at inspection of an open wound with signs of recent or ongoing bleeding [8]. A “sucking wound” suggesting a reference to the aerodigestive tract indicates an increased risk for “proximity” injuries to the major cervical arteries (i.e., the vertebral arteries). Even minor external signs of trauma is related to a severe underlying vascular injury. One example is that the expanding hematoma. The reverse however, is also possible – an oversized hematoma compressing adjacent structures harbored by the stiff fascial layers of the neck but undetectable at inspection. Sometimes signs of airway obstruction reveal such injuries.

Half of the patients with significant blunt vascular injuries to the neck lack symptoms at admission but develop symptoms and signs within 24 h. In blunt trauma, it's therefore important to perform a careful neurological examination at admission to get a baseline for later comparisons at the mandatory repeated examinations. The neurological evaluation should seek signs of central further as peripheral nerve injuries – alertness, motor and sensory function, reflexes within the extremities – as well as signs of nervus dysfunction. It's important to thoroughly inspect for signs of contusion, asymmetry, or deformity that indicate underlying hematomas and to notice the hematoma size for later estimation of possible expansion. Other physical findings indicating a vascular injury are tenderness over the carotid artery and within the scalp. the foremost common associated injury is fracture of the mandible.

Radiography:

The chest radiograph remains one in all the foremost commonly performed examinations in radiology [9]. It's typically the first radiologic examination obtained in patients presenting with chest pain, shortness of breath, or cough. within the hospital setting, chest radiographs are performed within the emergency room, critical care unit, and following the location of monitoring and support devices. Chest radiographs are routinely obtained prior to major surgical procedures, as a part of annual physical examinations, and to screen for metastatic disease in patients with malignancy or paraneoplastic syndromes.

The accurate interpretation of chest radiographs requires an understanding of the normal frontal and lateral chest radiographic appearances, as obscuration of normally visualized structures is also the only clue to the presence of an abnormality.

Radiography allows visualization and assessment of the chest wall, mediastinum, and hila including the heart and great vessels, central airways, the lungs including the pulmonary vasculature, the pleural surfaces including the fissures and also the diaphragm.

The superimposition of complex structures of various radiographic density (gas, water, calcium, metal, and fat) makes radiographic interpretation challenging. An understanding of normal interfaces allows for detection of conditions that manifest with chest symptoms or as asymptomatic abnormalities.

CMR:

Some other appropriate uses of CMR (cardiac magnetic resonance) include the assessment of pericardial conditions like pericardial mass and constrictive pericarditis [10]. Specifically, in constrictive pericarditis, CMR can help assess the thickness of the pericardium,



predict the presence of pericardial enhancement suggestive recent pericardial inflammation or neovascularization, and assess some of the physiologic changes seen.

CMR can even be used to assess the pulmonary vein anatomy prior to ablation for fibrillation. The number, size, and orientation of the pulmonary veins is assessed, and data about the left atrium may also be provided.

CMR is also used for the assessment of aortic dissection and is commonly used in follow-up examinations and postsurgical assessments. However, given the length of the examination and difficulty monitoring the patient closely during the examination, CMR is usually not considered the first modality for dissection assessment within the acute setting.

MRI:

Magnetic resonance imaging (MRI) is traditionally the standard method of assessing ventricular dimensions, function as well as fibrosis [11]. Imaging studies with cardiac MRIs have shown evidence of diffuse myocardial fibrosis in uremic patients, which could be a distinctly different pattern from subendocardial fibrosis seen in ischemic heart disease. The association of gadolinium with nephrogenic systemic fibrosis (NSF), has led to the decreased usage of this modality. Additionally, MRI can not be used in patients with implantable devices like internal cardioverter defibrillator (ICD) and pacemakers which are found during a significant number of patients with cardiomyopathy (CM).

Due to these limitations, echocardiography, with its widespread availability and ease of administration, is usually employed to evaluate myocardial properties and function in patients with a suspected cardiomyopathy. A depressed ejection fraction can clinch a diagnosis of LV dysfunction. Echocardiography may assess LVH (Left ventricular hypertrophy), LV mass index (LVMI), as well as chamber sizes and dimensions. Continuous wave Doppler and tissue Doppler measurements may be useful in determining degree of DD (diastolic dysfunction), as can assessment of left atrial volume index. Unfortunately, echocardiography is restricted by skills of the technician, acoustic windows, poor endocardial enhancements, and interobserver reader variability. Additionally, many diastolic parameters are strongly load dependent and might be challenging in dialysis patients where relative high preload can mask DD. Nevertheless, despite its limitation, echocardiography remains the initial test for choice for diagnosing cardiomyopathy in CKD/ESKD (chronic kidney disease/end-stage kidney disease) patients.

The gold standard test for diagnosing DD is an invasive heart catheterization. A diagnosis is made with elevated filling pressures with mean pulmonary capillary wedge pressure >12 or LV end diastolic pressure >16. However, since this modality is invasive and subjects patients to increased risk, it's often reserved for cases where a diagnosis can't be made by other imaging tests.

MRI safety requirements preclude the examination of patients possessing implanted electronic devices or some potentially mobile ferro-magnetic foreign bodies [12]. Even non-ferro-magnetic electrically conductive materials can become heated in a very strong magnetic field. Thus, some invasive monitoring

devices used in the ICU (intensive care unit), like continuous cardiac output thermodilution pulmonary artery catheters and urinary catheter temperature probes, shouldn't be brought into the MRI scanner. Completion of local safety screening requirements is mandatory for all patients and staff prior to entry into the MRI scanner room. Nevertheless, with appropriate use of modern MRI-compatible equipment, including invasive blood pressure monitoring and advanced mechanical ventilators, all but the foremost unstable patients is examined under appropriate medical supervision. Given that a technique of safely and reliably measuring RBF (renal blood flow) during critical illness might now be available, it's pertinent to examine why these measurements are important and what mechanistic insights they could provide.

Conclusion:

Heart health is best maintained by preventing cardiovascular disease. Age, gender, cholesterol levels, blood pressure values, and smoking status are required to determine the risk for each patient. Successful identification of high-risk patients and action on these risk factors can significantly reduce cardiovascular risk. Cardiac examination begins with an ECG and blood pressure measurement, and continues with a medical history and physical examination of the patient. Based on the obtained data, the disease can be diagnosed and treatment can be started. It is important to point out that the data obtained may be insufficient and that additional tests are needed.

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