EDITORIALS

Chest—The Cardiopulmonary Journal

Current issues of Chest carry the subtitle, “The Cardiopulmonary Journal” as a replacement for the former listing, “The Journal of Circulation, Respiration and Related Systems.” The change does not mean that this periodical has abandoned a basic interest in the mechanisms of circulation and respiration; rather, the transition was made because the new title more accurately reflects the medical realities of today.

In an analysis of a national survey of chest physicians and surgeons, I noted that much confusion could be avoided if the terms cardiopulmonary clinician and cardiopulmonary surgeon were in common usage. A detailed questionnaire concerning clinicians’ professional practices indicated that the entrenched habit of labelling clinicians as cardiologists, pulmonary specialists and either thoracic or cardiovascular surgeons had resulted in an inaccurate picture of medical practice. A majority of the members of the ACCP and the subscribers to Chest who identified themselves as cardiologists regularly diagnose and treat patients with pulmonary disease. Pulmonary specialists indicated that a significant portion of their professional activities also included the management of patients with cardiovascular diseases. Nearly all thoracic surgeons who responded to this questionnaire operated upon patients with cardiovascular and pulmonary surgical problems. I suggested that the results of this questionnaire should not have come as a surprise because, “The intimate physiologic and pathologic relationship between the respiratory and circulatory systems and the functional and anatomic contiguity of thoracic structures offer a logical explanation of the clinician’s professional practices.” Since completion of that questionnaire medical trends in practice, teaching and research have validated the conclusion that the cardiopulmonary physician and the cardiopulmonary surgeon not only exist, but they flourish!

*Indeed, the term “cardiopulmonary” traditionally identifies those departments and institutions which encourage dialog between the disciplines of respiration and circulation.

Therefore, if we are to meet the professional needs of the members of ACCP and nonmember subscribers to Chest, we dare not compartmentalize the chest. Chest, the official publication of the American College of Chest Physicians, must “avoid the clinical isolation of disciplines related to circulation and respiration. An artificial dichotomy between heart and lung disease is inconsistent with optimum care of the patient.”

There are excellent specialty societies in cardiology, pulmonary medicine and thoracic surgery. The American College of Chest Physicians is proud of its professional liaison with these organizations in a variety of areas such as legislative action, joint educational programs and many other activities. Our unique role, however, remains that of a multidisciplinary society. It is our function to provide the educational forum which enhances dialogue among the subspecialties which comprise our membership and readership of Chest. It is these opportunities, privileges and responsibilities which served as the impetus for the change in the subtitle of our journal to “Chest—The Cardiopulmonary Journal.”

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REFERENCE


Radionuclide Assessment of Right and Left Ventricular Function by Multiple Gated Acquisition Cardiac Imaging

Gated cardiac blood-pool imaging was initially developed as a scintigraphic radionuclide technique for obtaining end-systolic and end-diastolic images of the left ventricular cavity. Following injection of an intravascular radiopharmaceutical, the intracardiac blood pool was imaged in multiple views with a gamma scintillation camera gated electronically to the ECG so that counts were collected only in end-systole and end-diastole. Previous studies
have demonstrated the value of this noninvasive radionuclide approach for measurement of left ventricular ejection fraction,6,8 analysis of regional ventricular wall motion,1,3 assessment of congestive heart failure,4 evaluation of ventricular performance after myocardial infarction,9 and detection of left ventricular aneurysm,6 atrial myxoma,7 and hypertrophic cardiomyopathy.9

Recently applied advances in minicomputer techniques have considerably enhanced the diagnostic potential of gated cardiac imaging. Multiple gated acquisition cardiac imaging utilizes a minicomputer system programmed for collection and storage of multiple images recorded throughout the cardiac cycle.9 After acquisition of greater than 200,000 counts in each of 28 frames per cardiac cycle, the data are displayed serially in a high resolution, endless-loop movie format similar to contrast cineradiography. This approach permits simultaneous visualization of the contraction patterns of the right and left ventricles and atria in real time.

Since changes in regional radioactivity recorded over the left ventricle are proportional to changes in ventricular volume, the left ventricular ejection fraction can be directly calculated from end-diastolic and end-systolic counts, after appropriate background correction. Rates of left ventricular filling and emptying can be measured from time-activity curves recorded over the left ventricle. The accuracy of multiple gated acquisition imaging for measurement of ejection fraction and for graded assessment of regional ventricular wall motion has been well validated by comparison with contrast ventriculograms.8,11

Although the resolution of gated cardiac images is inferior to the resolution of contrast ventriculograms, the radionuclide approach offers several important advantages. Cardiac images are collected noninvasively without disturbing ventricular function or inducing arrhythmias. Serial images can be collected repeatedly for several hours following injection of a single radiopharmaceutical dose for assessment of left ventricular performance before and after therapeutic interventions.12 Mobile gamma cameras and computers permit bedside assessment of global and regional ventricular performance in critically-ill patients in the intensive care unit. Furthermore, gated cardiac imaging permits simultaneous visualization of the right ventricular blood pool, providing a new investigative approach for evaluation of the size, contraction pattern, and ejection fraction of the right ventricle. This noninvasive method has recently proven useful for evaluation of cor pulmonale in patients with chronic obstructive pulmonary disease.13

In this issue of Chest (see page 396), Bianco and co-workers explore clinical indications for gated cardiac imaging in patients with coronary artery disease and suspected left ventricular dysfunction. Not surprisingly, they observed that gated cardiac imaging was superior to chest x-ray films for detection of left ventricular dysfunction. They documented the important finding that a normal chest roentgenogram with normal cardiothoracic ratio does not exclude the presence of regional wall motion abnormalities or depressed ejection fraction in significant numbers of patients with coronary artery disease. Gated cardiac imaging is particularly suitable for evaluation of regional and global ventricular function in patients with coronary disease because the extent of contraction of all ventricular segments can be evaluated in multiple projections. Among patients with coronary artery disease, gated cardiac imaging is clinically most useful for detecting ventricular aneurysms and for identifying patients with extensive left ventricular dysfunction who are unlikely to benefit from operation.

The recent introduction of multiple gated acquisition cardiac imaging into clinical cardiology provides an important new diagnostic tool for the noninvasive assessment of right and left ventricular performance. Since radionuclide data are quantitative, reproducible, and noninvasively obtained, gated cardiac imaging is ideally suited for investigative studies of the effect of therapeutic interventions on ventricular performance.

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REFERENCES
Effects of Smoke Inhalation

In simplistic terms, smoke can be defined as a suspension of small particles in heated gases. Particles less than 1 to 3 \( \mu \text{m} \) are, for the most part, filtered out by the nose, oral mucosa, and pharynx. It is the acids and the aldehydes that coat these particles that cause the symptoms of irritation, \textit{i.e.}, lacrimation, burning of the throat, and nausea and vomiting when swallowed. Inhalation of some of the small particles into the airways is probably the cause of the bronchospasm that can occur in patients with smoke inhalation.

Under usual circumstances, heat does not enter the trachea because of the rapid cooling that occurs in the larynx. Therefore, thermal injury to the lungs is not felt to play a significant part in injury due to smoke inhalation.

It is the inhalation of the gases that probably causes the major injury. The gases can be divided into nonpulmonary irritants, such as CO, and carbon monoxide, and pulmonary irritants, \textit{i.e.}, phosgene, hydrogen chloride, ammonia, etc. Carbon dioxide produced during the consumption of oxygen causes hyperventilation. Carbon monoxide by its combination with hemoglobin to form COHb and by shifting the oxyhemoglobin saturation curve to the left causes tissue hypoxia.

The inhalation of pulmonary irritant gases during fires has increased in recent years with the great increase in the use of plastics. Many of these gases, \textit{eg}, phosgene and hydrogen chloride, are released with the burning of polyvinyl chloride, are known to be very toxic to the lungs. Since the composition of the gases and their relative toxicity as well as the quantity inhaled will vary with each exposure, it can be expected that the effects of the smoke inhalation will also vary.

Acute injury and death following a fire involving polyvinyl chloride has been documented.\(^1\) Acute hypoxemia in fire fighters following exposure to smoke from the burning of various plastics has recently been described.\(^2\) The hypoxemia that can occur during fires is in addition to the possible presence of tissue hypoxia secondary to carbon monoxide which does not effect the partial pressure of oxygen in the blood. This reduction in oxygenation in the face of increasing demands for oxygen consumption that occurs associated with the vigorous exercise needed to fight the fire, places the fire fighter in a very vulnerable position for tissue necrosis, \textit{eg.}, myocardial infarction. One study using continuous ECG recordings demonstrated an increase in the cardiac rate of veteran fire fighters to greater than 150 beats per minute at the sound of the fire alarm and during the transportation in the fire trucks even before the physical labor of fighting the fire began.\(^3\)

While the danger of acute injury is very real, the possibility of slow chronic injury to the lungs is much more uncertain. Various studies involving fire fighters have both claimed and denied the existence of chronic pulmonary damage.\(^4,5\)

In this issue of \textit{Chest} (see page 369), Loke and co-workers have used a sensitive technique for measuring small airways disease (comparing air and helium oxygen flow volume curves) to determine if there is an increased risk of lung disease in fire fighters chronically exposed to smoke inhalation. While the existence of a significant increase in small airways disease in nonsmoking fire fighters remains in doubt, there is no doubt that fire fighters who smoked fared a lot worse than their nonsmoking colleagues. While we are uncertain of the significance of early small airways disease in relation to progressive pulmonary disease and disability, we are certain that there is both a much higher incidence of small airways abnormalities and chronic obstructive pulmonary disease, (emphysema and chronic bronchitis), in cigarette smokers. In addition, it is known that cigarette smokers can have a higher baseline COHb level than nonsmokers. Smoke inhalation with possible acute hypoxemia and carboxyhemoglobinemia superimposed on an already elevated COHb level could put these fire fighters in a greater risk of acute injury.

Fire fighters, by their very occupation, are at great risk of bodily harm. Their major protection from smoke inhalation and pulmonary damage is the proper use of the self-contained air pack and mask. It would seem that the second defense for both the acute and chronic effects of inhalation...