a secondary diagnosis. On the other hand, steady progress in the therapy of malignant and infectious diseases should increase the value of secondary diagnostic procedures. The value to the individual patient must be carefully balanced in each individual instance.

Regarding this entire issue, Neff's thoughtful and questioning approach and advice "how vs whom?" still holds as a guideline to be applied by all physicians when contemplating a lung biopsy, even though other authors have attributed lower morbidity and mortality to open-lung biopsies and fiberoptic transbronchial biopsies than do the current investigators. At this time, there is no controlled study showing that the use of more invasive diagnostic techniques appreciably improves the long-term prognosis for any given class of patients.

What is most important is a well-reasoned approach carried out by a thoughtful physician with the ability and judgment to obtain and integrate basic data that can logically be applied to individual patients. Tenholder and Hooper present a fresh approach to the evaluation of the chest x-ray film in the compromised host. They encourage us to evaluate the diagnostic probabilities in terms of the patients' therapy and the distribution of the infiltrates. They prod us to evaluate the efficacy and morbidity of diagnostic procedures in our own institutions, so we may make the best decisions for our patients, keeping in mind a cost-effective approach to the individual therapy for each case. Further prospective studies of specific patient groups, such as those with metastatic solid tumors, lymphomas, organ transplants, and others, will provide a concise and scientific medical approach to management of these complex problems.

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REFERENCES


So Much, So Little

Scientific literature is subject to many facets of editing, beginning with the investigators and ending with the journal editors, all of whom leave their marks and personal biases on the preparation of a scientific report. Too often incomplete descriptions of the variables studied and variations in the experimental design result, rendering comparative analysis difficult or impossible. Thus, comprehensive understanding of a given subject is lacking in spite of a burgeoning mass of literature. The question which Mihm et al attempt to answer in this issue (see page 452) appears to be plagued by these problems.

Can a high oxygen gas tension in mixed venous blood, which results from contamination by pulmonary capillary blood, be related to the rate at which blood is withdrawn from a pulmonary artery catheter? This question has been addressed previously. Mihm et al and Shapiro and colleagues found no falsely high mixed venous oxygen tensions at either slow or rapid rates of blood withdrawal. Similar results were reported by Suter et al when withdrawal rates were slow, but rapid withdrawal occasionally increased mixed venous oxygen tension. If a sample of mixed venous blood can be contaminated with pulmonary capillary blood, why is it observed only occasionally? An explanation has been offered by Mihm et al.

After initial placement of a catheter, repeated balloon inflation may cause the catheter tip to move distally. If the tip should wedge in a pulmonary arteriole, withdrawal of blood may result in contamination with pulmonary capillary blood. This is a reasonable explanation; however, each author reported that before and after every sampling a pulmonary occluded (wedge) pressure was obtained with balloon inflation and a pulmonary artery trace after deflation. If this were true, catheter migration and wedging may not be such a reasonable explanation.

A sample of mixed venous blood from a normally positioned catheter can be contaminated with pulmonary capillary blood only if antegrade flow of pulmonary arterial blood is exceeded by the rate of its withdrawal, causing retrograde flow from pulmonary capillaries. The possibility of this occurrence would be increased if the diameter of seg-
mental arteries and their blood flow were reduced by such factors as a decrease in venous return or cardiac output, an increase in pulmonary vascular resistance or by mechanical ventilation, especially with positive end-expiratory pressure. Under these conditions, contamination may occur without distal migration or wedging of the catheter tip. Unfortunately, in each study, information concerning these factors is scanty.

Based on information provided, the following may be speculated. In the study by Shapiro et al, patients underwent elective cardiac catheterization and breathed room air spontaneously. Similarly, Mihm et al studied 12 patients, seven of whom required mechanical ventilation but even they breathed spontaneously between mechanical breaths. (Patients received IMV, personal communication.) In addition, a low concentration of oxygen was inspired. In each study, the rate at which blood was withdrawn appeared to have no effect on oxygen tension of the sample.

In contrast, the patients of Suter and associates, who were critically ill, received controlled mechanical ventilation with pure oxygen. When blood was withdrawn rapidly, the increased venous oxygen tension observed in some samples may have been caused by the absence of spontaneous breathing, decreased cardiac output, and/or increased pulmonary vascular resistance. Furthermore, the inspiration of pure oxygen may accentuate the effect of retrograde flow on mixed venous blood by greatly increasing the oxygen tension of pulmonary capillary blood. With similar conditions of mechanical ventilation and oxygen administration to laboratory dogs, Shapiro et al also noted contamination. Thus, it may be the absence of spontaneous ventilation and the resulting cardiopulmonary changes and/or oxygen administration that results in the occasional contamination of mixed venous blood by pulmonary capillary blood.

Other factors may have play in interpreting these results. Shapiro et al and Suter et al sampled blood from the pulmonary artery catheter and compared results obtained with blood sampled from just distal to the pulmonic valve. Any contamination of a sample would be readily apparent. Mihm et al compared results obtained with rapid withdrawal rates with those obtained with their lowest withdrawal rates. If contamination occurred independently of withdrawal rate, it would not be detected. Thus, a slight alteration in the study design renders any comparison of results less valuable.

The effect of blood withdrawal rate on the contamination of mixed venous blood by pulmonary capillary blood remains unclear. Numerous cardio-pulmonary factors may influence the withdrawal of pulmonary capillary blood during pulmonary artery blood sampling. These factors may have been elucidated if sufficient information had been provided in earlier reports. Unfortunately, our inability to compare existing studies is not unique. It is in the best interests of clinical and investigative medicine for authors to provide complete and precise descriptive data concerning subjects and results. This will allow investigators and clinicians to more thoroughly compare and evaluate past and present information. Such practice, although increasing the length of some manuscripts, should increase the efficiency of data assimilation.

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References


Is 12-Hour Oxygen as Effective as 24-Hour Oxygen in Advanced Chronic Obstructive Pulmonary Disease with Hypoxemia? (The Nocturnal Oxygen Therapy Trial--NOTT)

Certain patients with hypoxemic chronic obstructive pulmonary disease (COPD) are candidates for home oxygen therapy. Although this adjunctive modality of treatment is expensive, a variety of benefits accrue: improvements in exercise tolerance, reduced pulmonary arterial hypertension, improved neuropsychological function and electroencephalograms, reduction of red blood cell mass, return to or maintenance of gainful employment, and reduced hospitalization and costs.

Not yet answered is the question regarding the length of time each day hypoxemic patients with COPD should receive oxygen in their homes. Studies among a few patients suggest that oxygen administration for 12 to 15 hours daily will reduce pulmonary arterial hypertension and pulmonary vascular resistance, and may be as effective as oxygen given continuously. As a result of these data and recommendations from the Sugarloaf Conference on the Scientific Basis for Respiratory Therapy,5 the Nocturnal Oxygen Therapy Trial (NOTT) was initiated as a contract award to six centers by the Division of

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