

BOOK REVIEWS

Edward Lowenstein, M.D., Editor

The Pulmonary Artery Catheter: Methodology and Clinical Application. BY CHARLES L. SPRUNG. University Park Press, 1983. Pages: 208. Price \$19.95.

The authors state this text "represents an attempt to unify in one book the concepts and information available in the medical literature pertaining to pulmonary artery catheterization." To accomplish this goal, they conveniently separated the text into two main sections: the first, consisting of three chapters, discusses the methodology; and the second, containing two chapters, the clinical applications of the pulmonary artery catheter. To begin, chapter one describes the indications and contraindications for pulmonary artery catheterization. Although, the indications could be condensed by eliminating closely related reasons, it remains a comprehensive list with adequate justifications for insertion. The second chapter details the insertion of the catheter, from the electronics of the transducer-monitor system, to the measurements, interpretations, and pitfalls of the system. A complete, detailed, well-referenced list of complications is described in chapter three. In the second section, chapter four deals with direct measurements and derived calculations using the pulmonary artery catheter. Finally, the last chapter is a composite of case studies describing the usefulness of the catheter. It is an excellent review of basic cardiopulmonary physiology pertaining to these common medical-surgical problems.

Throughout most of the text, the authors maintain an open mind regarding controversial aspects but become parochial regarding technique of insertion. They state, "there are many approaches with as many advocates, but a technique has been developed especially to ensure safety." The safety of a particular insertion technique appears directly related to the experience of the inserter. This reviewer, however, is concerned about the safety of a method employing the use of a #14 gauge needle over a #22 spinal needle. Most would agree that the longer the introducing needle, the less control or "feel" one has during the puncture. Furthermore, the puncture of a carotid artery with a larger gauge needle has a higher likelihood of causing hematoma formation, especially when heparinization is required. Repeated statements are made concerning the safety of placing a CVP catheter through the #14 needle and then introducing a guidewire through this catheter to "minimize the risk of puncturing the vessel wall" by the guidewire. In the chapter dealing with complications, no documentation is provided of the incidence of guidewire perforations. Finally, the method described for measuring thermoluted cardiac output is indeed sterile, but cumbersome, and appears impractical in a setting of hemodynamic instability, necessitating repeated cardiac output over a short period.

With these exceptions, the authors have succeeded in writing a text that is concise and detailed. The entire book is easy to read and well organized, it contains accurate information, and is well-referenced for those who desire in-depth knowledge. It will be of particular benefit to the novice encountering the complexities of the pulmonary artery catheter. In conclusion, this manual is must reading for those skeptical of the value of the pulmonary artery catheter.

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Pulmonary Surfactant System. EDITED BY E. V. COSMI AND E. M. SCARPELLI. Amsterdam, Elsevier Science Publishers. Pages: 401. Price: \$88.50.

Pulmonary Surfactant System, compiles 32 manuscripts selected from a large number presented at an International Symposium sponsored by the Giovanni Lorenzini Foundation in Rome, March 2-4,

1983. The Symposium called together many of the leaders in the field from many countries focused on selected features of morphology, biophysics, composition of alveolar wash, mechanics, and muscle fatigue. Evaluation of newer therapies of respiratory distress syndrome such as high-frequency ventilation and ambroxol and surfactant replacement are the subject of half the contributions. The role of surfactants in mucociliary transport is covered in six reports. Scarpelli summarizes his elegant and convincing studies of bubble formation in terminal air spaces of babies. Seeing is believing, and there is little doubt that bubble formation occurs. It might seem that this would present a barrier to gaseous diffusion, but this is unlikely because the extra wall of bubble that blocks the alveolus and is faced by an advancing O₂ molecule represents a very small fraction to the thickness of the alveolar capillary membrane.

Hill then argues that bubbles won't wash, that bubbles will make alveolar walls thicker and interfere with gas transport, that surface forces of alveolar wash measured against surface area in a Wilhelmy balance yield fallacious results, and that it makes no sense to have a substance lining alveoli that makes the body work harder. He argues for adsorption of surfactant to alveolar surfaces through electrical interactions between surface charges and zwitterions in phosphatidylcholine. This would produce dry patches with adjacent puddles convex to the alveolar surface working to maintain alveolar inflation and prevent flooding. In a sense, this argument is the opposite of that usually proposed. He accrues several lines of convincing data from anatomic observations and biophysical behavior of liquid-liquid interfaces. Regrettably, one is left having seen bubbles and then told that by all accounts they shouldn't be there. Before Scarpelli's bubbles burst, we need further exploration of quantitative biophysical models.

Cosmi *et al.* provide a valuable service in presenting a comprehensive analysis of all the techniques recommended for diagnosis of lung maturity. They conclude that we have excellent methods of diagnosing maturity with 99% accuracy, but we still have problems identifying immaturity.

Based on an analysis of respiratory mechanics and muscle function in the newborn, Milic-Emili proposed that the newborn under normal circumstances verges on diaphragmatic fatigue. He calculated the tension-time index that reflect the strength and duration of diaphragmatic contraction based primarily on the work of Mortola (J Appl Physiol 52:1209, 1982). These data were collected from healthy infants and were not corrected for a 10-ml dead space in the face mask. Correction yields an index that is 40% less, moving the infant closer to the adult and farther from the fatigue threshold.

The most promising new therapy, replacement of surfactant, is adequately reviewed by Robertson. High-frequency ventilation needs considerable investigation, but its use in a few cases has not yielded obvious benefits. There are 10 reports of the effects of ambroxol, a bromhexine metabolite, but no discussion of the pharmacologic actions and kinetics of this agent. It increases ³H palmitate incorporation into type II alveolar cells, increases surfactant activity, fetal lung maturity, amniotic L/S ratio, dynamic compliance, and mucociliary transport, with the anticipated beneficial effects on pulmonary gas exchange. It also blocks the adverse effects on lung compliance of many inhalation anesthetics and antimetabolites.

The final chapters alert the reader to the role of surfactant in promoting clearance of inhaled particles from the airways. Further research in this area may contribute to a better understanding of the adverse effects of inhaled gaseous and solid substances.

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