Monitoring the Nervous System for Anesthesiologists and Other Health Care Professionals

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This book is a welcome addition to reference works devoted to the expanding field of nervous system monitoring in the intraoperative period. This publication will serve as a useful guide for many different health care professionals and particularly for anesthesiologists involved with this monitoring modality.

The stated goal of this volume is to “facilitate the most effective team effort by expanding the interface of knowledge between surgical, anesthesiological, and neurophysiological members” of the intraoperative monitoring (IOM) team. The writers drew on the contributions of many pioneers whose curiosity, careful observation, and thoughtful reflection built the field of IOM. Sixty-nine authors directed by three editors created a comprehensive reference of more than 800 pages.

A secondary goal of this manuscript is to restore the role of anesthesiologists in the IOM team. The knowledge and experience gained by anesthesiologists and other professionals is an important complement to the attributes of neurophysiological monitoring.

The editors address an important area in the operative care of patients whose nervous systems are at risk of injury during procedures by orthopedic, neurological, ENT (ear, nose, and throat), or vascular surgeons. Early on, they assert the fundamental tenets of IOM: “...functional knowledge of the nervous system is an important partner to structural knowledge and both contribute to the quality of care and patient safety”; and “...prompt diagnosis of circumstances unfavourable to the nervous system will enable timely adjustment of the pharmacological and physiological environment to augment surgical decision”.

Some of that reversibility will be contained in the surgical maneuvers, but changes in the management of anesthesia, physiology, and positioning of the patient can mitigate unfavourable circumstances. A delicate anesthesia balance requires a team effort; thus, work in this area of IOM requires interplay of different disciplines and an understanding of each other's roles.

In the preface of this publication, the editors present an excellent summary of the clinical application of IOM and set the tone and focus of the entire volume. Furthermore, three accompanying forewords create an historical context for this work. The textbook is arranged in four parts: a) “Techniques of Monitoring”; b) “Anesthesia Considerations”; c) “Case-Based Presentations”; and d) “Intensive Care Monitoring”.

Part I is devoted to aspects of IOM involving neurophysiology and monitoring devices. It is critical that all team members have a grasp of basic monitoring techniques, particularly the part of the nervous system being assessed and the constraints required for success. This section is a treasure chest of information; it includes discussions on transcranial Doppler, near-infrared spectroscopy, jugular venous oxygen saturation, deep brain stimulation, and intracranial pressure.

Part II deals with the pharmacology of anesthesia agents and the physiological responses to surgical stress and their impact on IOM. It is critical for anesthesiologists to recognize their ability to affect the quality of monitoring. It is also important for non-anesthesiologists to understand the variable responses to medications, the variety of medications that could be used, and the limits imposed by the clinical status of individual patients. The authors in this section have provided clear discussions and practical strategies.

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Part III is the major strength of the reference book. In the context of the particular features of a surgical procedure, team members clarify their concerns and develop a plan for safe surgery and effective IOM. In various operative circumstances, the reader learns how the IOM team collaborates in order to optimize conditions for monitoring, troubleshoot undesired developments, detect meaningful changes in observed signals, and reach prompt decisions to guide the surgeon's intervention. Progressively, the principles of practice of an effective IOM team are clarified. The dynamic interplay of surgery, physiology, and anesthesia management is clearly presented.

Part IV, the final section, is an overview of the application of IOM tools in the intensive care unit setting. The discussion of monitoring cerebral blood flow is particularly useful.

Most chapters work well to meet the book's goal of developing an effective IOM team. Chapters 28, 29, 30, 31, and 34 are particularly informative. Chapter 28, "Anterior Cervical Spine Surgery", and Chapter 29, "Posterior Cervical Spine Surgery", together provide an excellent knowledge base. Chapter 28 includes superb case examples to illustrate principles of IOM, and Chapter 29 includes a clear discussion of spinal cord disease as it relates to the cervical spine and the planning strategy for surgery.

Some chapters fall below the overall high quality of the textbook and are flawed by inadequate proofreading. For example, Chapter 2, "Transcranial Motor Evoked Potentials", is an excellent review of this area of IOM; however, Figure 2.1 is included to illustrate motor pathways and potentials but erroneously illustrates sensory pathways and sensory potential recordings. This is most unfortunate, adding confusion to a complicated topic. Hopefully, the publisher will address this issue. It would be helpful to include a second figure in Chapter 2 that depicts sensory function. As another example, Chapter 5, "Deep Brain

Stimulation", provides a detailed discussion of this developing surgical field. Unfortunately, the quality of the chapter is weakened by comments that show incomplete understanding of anesthesia drugs (propofol is rapidly metabolized, propofol boluses of 20–50 mg·kg⁻¹, avoidance of all opiates because of long half-lives). Many acronyms are employed, some of which are defined only later in the text or not at all. All intraoperative complications (including agitation, confusion, and intracranial hemorrhage) are stated to be anesthesia-related. Furthermore, although Chapter 26, "ENT and Anterior Neck Surgery", is a useful guide in this area, it is marred by an unclear description of the effects of anesthesia medications on IOM in Table 26.1. The focus of the entries is on drugs and doses not commonly employed in the operating room ("> 20 mg·kg⁻¹ of thiopental", "> 9 mg·kg⁻¹ of pentobarbital"). The dose response of inhalation agents is described in relation to a single end-tidal concentration for all agents ("exceeds 1.5%"), whereas, the term, minimal alveolar concentration (MAC), would be preferable. Some monitoring techniques are partially described using obscure undefined terms ("evoked otoacoustic emissions"), and other minor errors escaped proofreading ("*autonomic* muting circuitry", page 508 and "under a lighter plane of *aspirator*", page 511).

The goal set by the editors of this publication is similar to that set by Dr. Wilder Penfield when developing the Montreal Neurological Institute. He chose to bring the skills of many persons in related fields together in order to understand and treat problems of the nervous system.

Overall, this work is an excellent reference that would serve as a helpful guide both to the novice and to the developing expert in this field.

Competing interests None declared.