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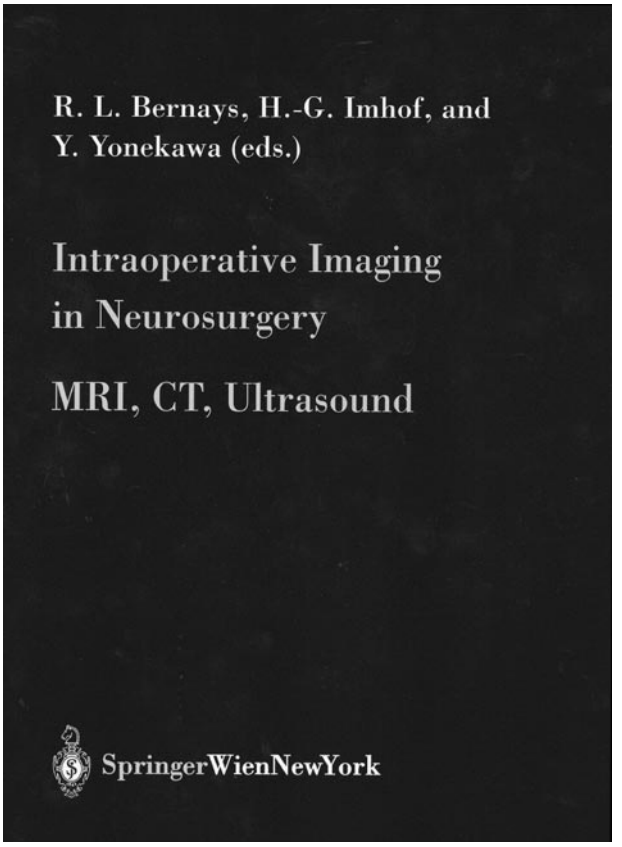
Intraoperative Imaging in Neurosurgery: MRI, CT, U/S
R. L. Bernays, H.-G. Imhof, and Y. Yonekawa, Bernay S R, Imhof H, Yonekawa Y, eds. Springer-Verlag. 144 pages. $99

During the past several years, there has been an increased recognition of the new possibilities that intraoperative imaging opens for our neurosurgical colleagues. This has spurred the proliferation of intraoperative imaging devices, including a variety of MR imaging–, CT-, and ultrasound-based systems. It has become difficult for any one person within the neurosurgical community, let alone within the neuroradiology community, to follow the rapid developments in this field. *Intraoperative Imaging in Neurosurgery* is a collection of chapters that originated from presentations during the First Symposium on Intraoperative Imaging in Neurosurgery that was held in Zurich in January 2002. The text includes 18 separately authored chapters. There is a degree of unevenness in quality across individual chapters. Although many of the chapters are extremely well written and demonstrate careful attention to detail, others appear to have been somewhat more hastily prepared.

The text is organized into three sections: part 1, on interventional MR imaging technical development, selection, and application; part 2, on interventional MR imaging, navigation and glioma surgery; and part 3, on intraoperative imaging, including sonography, CT, and MR imaging. Although the first two parts proceed in a relatively orderly manner, part 3 is somewhat less well organized and appears to represent a collection of miscellaneous topics not fitting the organization for the first two parts.

The opening essay, authored by Dr. Ferenc Jolesz, from the Department of Radiology at Brigham and Women's Hospital, is titled "Future Perspectives in Intraoperative Imaging." In his usual eloquent fashion, Dr. Jolesz lays the foundation for the monograph through a brief background and discussion of the rationale for intraoperative imaging. The next chapter, "How to Choose a Magnet: Reflections on the Development of MR Imaging–Guided Neurosurgery," represents a very brief, albeit somewhat incomplete, history of intraoperative MR imaging. While informative, this chapter does not provide a sufficient basis from which choice of an intraoperative MR system can be made, and therefore does not quite live up to its title. The three chapters that follow represent three different approaches to intraoperative MR imaging, authored by the neurosurgeons who have been the primary drivers of the technology at the three institutions represented. These chapters nicely discuss the individual experiences at these institutions, presented by several of the earlier adopters of this technology. Unfortunately, the small number of chapters limits this section to a relatively narrow portion of the intraoperative MR imaging spectrum.



Part 2 begins with an outstanding chapter written by Dr. Ed Laws, a well-known neurosurgeon from the University of Virginia. This chapter provides a concise background on the biology of gliomas, followed by arguments for and against radical resection. This chapter then details the results of the "glioma outcome project," with an excellent discussion of when to perform biopsy, when to resect, and when to recommend watchful waiting for a glioma. This chapter represents the high point of the monograph from the perspective of a neuroradiologist, with many interesting observations written in a clear and concise fashion. The four chapters that follow again represent summaries of the specific results from four different intraoperative MR imaging sites. Although intended more for discussion of the results of surgery under MR imaging guidance, the discussion of methods provides many interesting details on intraoperative MR imaging approaches not adequately covered in part 1 and helps "flesh out" several of the holes in the initial section.

Part 3, including the final eight chapters, is somewhat less thematic in its organization and contains

topics varying from intraoperative sonography imaging for real-time navigation of stereotactic biopsy, sonography for guidance during craniotomy, CT-guided neurosurgery by using a mobile CT scanner, and combined intraoperative MR imaging and sonography. These chapters are grouped with two additional chapters on intraoperative MR imaging, one describing the Brigham and Women's Hospital experience and a second describing functional MR imaging at 1.5 T in the operating room. Although these last two chapters are well written, they would appear to belong more logically in the first part of the book. Finally, an excellent chapter by Dr. Walter Hall, from the Department of Neurosurgery at the University of Minnesota, explores the costs and benefits of intraoperative MR-guided brain tumor resection, providing much compelling information that may be very useful in motivating an institution to make the investment required to pursue this direction of intraoperative guidance.

In reading through the monograph, it would appear that the symposium from which the publication originated provided an excellent forum for discussion of the pros and cons of different intraoperative imaging techniques. As such, the editors gathered many of the opinion leaders in intraoperative imaging in neurosurgery. Unfortunately, the organization of the text does not lend itself to comprehensive coverage of the topic and results in somewhat choppy coverage of this fascinating field. Although there are several outstanding chapters, there are others that could be easily skipped without tremendous loss from the neuroradiologist's perspective. Though the text may be of interest to neurosurgeons hoping to gain familiarity with the field, the monograph is of more limited usefulness for the neuroradiology community and provides relatively little insight into the many interesting imaging issues associated with intraoperative MR imaging, CT, and sonography. Many of these issues, along with more comprehensive coverage of intraoperative MR imaging, may be found in other sources in the radiology literature. For example, the issue of *Neuroimaging Clinics of North America* published in 2001 on this topic, edited by Dr. Chip Truwit, provides a much more logical introduction to this material. As such, I am unable to recommend this monograph for the neuroradiology community. Nonetheless, specific chapters, in particular those by Dr. Laws on the rationale for glioma resection and by Dr. Hall on costs and benefits, do represent truly useful additions to the published literature on intraoperative imaging in neurosurgery.