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Biomechanics of Spine Stabilization

Edited by Edward C. Benzel, MD. Rolling Meadows, IL: American Association of Neurological Surgeons; 2001. Price \$150.00 with CD-ROM, 526 pages, 800 illustrations.

This is an important book. Under one cover, Dr. Benzel has amassed virtually all of the key elements required to understand, interpret, and treat spine instability. In an era of multi-authored texts, Dr. Benzel has written this entire book (32 chapters, 525 pages) himself, with outstanding assistance from his medical illustrator, Michael Norviel, CMI. Marvelously illustrated, succinctly written, and logically presented, this is a book that should be purchased by or readily available to every radiologist, particularly those who deal with a large spine surgery service.

Although the title *Biomechanics of Spine Stabilization* might make one think that the material is dull and not germane to the practice of radiology, the opposite is true. Do not expect to see high quality or numerous radiographic or MR imaging studies; in fact, if there is one criticism (and this is relatively minor, considering the overall quality of the book), it is the low resolution and questionable quality of a number of the presented x-rays. Also, statements such as “a high field (1.5 T) has better anatomic resolution but worse soft tissue injury definition sensitivity than a low field system (0.064 T)” is questionable and detracts somewhat from an otherwise credible book. These points notwithstanding, the value of this text lies in its ability to first explain, both in words and by diagrams, the forces at work in those abnormalities that result in spine instability and to then take the reader through various spinal constructs used to stabilize the spine. As I read this book, I realize that it contains information about which most radiologists are unaware, even when their daily work includes reading both pre- and postoperative spine images. This text reemphasizes that studying material in a field allied to imaging often provides greater insight than studying material in one’s own specialty.

The text logically starts with chapters on the anatomic structures of the spine, how they function biomechanically, and their kinematics. Each page contains information that can speak directly to film interpretation. A third chapter on spine stability (and instability) defines stability subjectively and then moves on to put instability on a more quantitative basis. The issue of “instability” has always seemed, to this reviewer at least, to be elusive. Ask a group of radiologists (or surgeons for that matter), to pin this concept down and to define when they would intervene and how they would intervene to stabilize the

patient, and you are apt to get a myriad of answers. Well, in one succinct chapter, Dr. Benzel describes the classic concepts and his notions of stability/instability. The information is particularly valuable because these are questions raised on a daily basis in film reading. New terms, at least to this reviewer, present themselves throughout the text; for instance, we see the term *glacial instability* (no, not an unstable spine in Buffalo, New York) and *the neutral zone* (no, not a football term). Examples such as these and the point system for instability may be familiar to our colleagues but not to the majority of radiologists.

Other chapters are equally illuminating. Included among the chapters that will be of particular interest to radiologists are Degenerative and Inflammatory Diseases; Trauma, Tumor and Infection; Spinal Deformations; Neural Element Injury; and Spinal Fusion. Other chapters delve into surgical approach material for constructs, theories in instrumentation, reason for construct, and instrumentation failure. These chapters all have information that cannot be found in radiology texts but that impact on the daily interpretation of images. In the chapter dealing with spinal trauma, the line drawings help implant into one’s mind the mechanisms of injury; this section, as most other sections, can be appreciated in large part by viewing the imaging/drawings and reading the legends that accompany them. Throughout the book, do not expect to view many radiographs, CT scans, or MR images. This is acceptable because the intent of the author is to describe the biomechanical problems involved in the different processes, and imaging just does not convey that information.

As an unexpected but greatly appreciated bonus of buying this book is the inclusion of a CD that contains not the text itself but rather all the images. Dr. Benzel has encouraged the people who purchase this book-CD combination to freely use the images in any educational format they wish. The preface gives carte blanche from the publisher (the American Association of Neurological Surgeons) and Dr. Benzel’s permission for the free use of the material; this is a first, to my knowledge, and something for which Dr. Benzel should be congratulated.

In summary, radiologists, particularly neuroradiologists, are encouraged to purchase this text, either for themselves or for their departments.

Case Review: Spine Imaging

Brian C. Bowen, MD, PhD. St. Louis, MO: Mosby; 2001. Price, \$39.95, 247 pages.

Here's the thing: this is a very, very good and useful book. As part of the Mosby "Case Review" series, edited by David Yousem, this publication follows their well-established didactic format. One or two interesting diagnostic images plus a brief history are presented on the right-hand page, along with some pretty hard questions. When the page is turned, the answers are provided so that the reader can check his or her knowledge, or lack thereof. Excellent discussions and pertinent references are also included, along with correlations to the full text of Mosby's *Neuroradiology: The Requisites* (a clear case of successful cross-promotion that would make Madison Avenue proud).

The Case Review series seeks to duplicate the "noon conference" and "board review" techniques that have been the staple of diagnostic radiologic and neuroradiologic education for decades. It works well, particularly in the hands of author Brian Bowen, who brings an attention to detail and a love of the teaching process to this work, which is obvious on every page. Dr. Bowen and his colleagues at the University of Miami are fortunate to have a very large and active spine service with which to work, and the excellent clinicians and emergency department at Jackson Memorial Hospital provide a huge amount of pathologic material.

Dr. Bowen knows the spine and covers almost everything a reader would want to know between the soft-back covers of this book, with few exceptions. Perhaps the only thing this reviewer could think of that has been left out is a case of acute Schmorl node, but that might be personal preference and certainly represents nit-picking. Everything else seems to be

included, from the mundane disk extrusion (an excellent example or three are scattered throughout the book, including some that do not even look like disks at all but turned out to be) to the truly bizarre and rare (this reviewer missed the case of Devic's syndrome on page 19). An account of an unusual, "expansive open-door laminoplasty" in the cervical spine is included on page 219, because it looks weird and might be mistaken for something else, but the many types of orthopedic spine metallic fusion devices and disk spacers used in spine surgery today are wisely not included. Good examples of postoperative laminectomies are included, with perineural scar or recurrent disk extrusions, but hardware is not included.

The spine cases are grouped into three relatively equal size sections: "Opening Round," "Fair Game," and "Challenge," which are approximately equivalent to "easy" ("basic"), "medium difficulty," and "really tough." All the cases represent interesting teaching points, and none are superfluous. The first two supposedly easy cases presented on page 3 turn out to include an epidural lipomatosis and a diastematomyelia with a single dural sac, so that gets the reader off to a good start. The last case presented in the book, on page 237, is one of wallerian degeneration in the cervical spine. A useful index listed by cases, in numerical order, is presented next, making it easy to look up particular cases, and a more traditional index is then provided.

This is a great teaching book. Residents and fellows will like it, especially at board review time, and experienced physicians in practice will like it to brush up on their spine diagnostic tools.

Radiology Picture Tests

R.R. Misra, M.C. Uthappa, N. Power, A. Mehta, O. Chan. City, ST: Greenwich Medical Media Limited; 2001. Price \$39.95, 280 pages.

This softcover handbook is intended to help its readers prepare for the Part I Fellow of the Royal College of Radiologists (FRCR) Film-Viewing Examination. The examination consists of five workstations, each with four films. The workstations are Plain Films, Contrast Studies, CT/Mammography, Ultrasound/Nuclear Medicine, and Angiography/MR Imaging.

The format of the book is simple, well organized, and easy to use. There are a total of 10 examinations, each consisting of 20 case-based pictures with questions and short answers. The questions address identification of anatomic structures, description of the studies, image quality, rates/dosages, identification of variants, and expected norms in size/caliber. The questions and answers are focused and succinct.

The overall quality of the examination images is

very good, although plain films, such as sinuses, skull, and extremities, seemed over-contrasted and less sharp in detail. Angiograms, CT scans, and most MR images are of surprisingly high quality and definition for a non-hardcover text. Images are well labeled in reference to the questions and do not obscure findings.

Regarding content, angiography is well covered for a basic text, but there is limited coverage of ultrasonography and nuclear medicine by comparison with the number of studies. No mammographic images are included in this book. Also, fairly uncommon contrast studies, such as sialograms, dactylograms, bronchograms, vasograms, and lymphangiograms are shown but are rarely performed or seen by entry-level radiology residents. There are less frequent presentations of more commonly performed contrast studies, such as barium enema and small bowel series.

Additionally, the examinations lack commonly performed newer studies, such as CT angiography of the pulmonary arteries and aorta, and have limited MR angiography. Testing concerning variant anatomy and pediatric cases could be more numerous to provide a more general collection of basic cases and questions. Additionally, the examinations might have been more effective as a study guide had they progressed in level of difficulty.

Overall, based on its relatively low cost, the book's

value, in terms of quality and preparation, achieves its objective in providing a quick study and learning tool for entry-level residents. Although the book has minor deficiencies in imaging, the image quality is good in general and is surprisingly high in certain areas. One of the book's major strong points is its user-friendliness. The layout is simply constructed, and the text is concise. In comparison with similar study tools, I find the book to be a quality resource for its targeted audience.