Many years ago as a young neurologist I found myself, more or less by chance, with a temporary appointment in the neuroradiological staff of the University Hospital Groningen. As it turned out, this “temporary” excursion proved to be more permanent than I had anticipated, and some thirty years later, I look back on a career in neuroradiology, which has centred importantly on spinal imaging.

An encounter of crucial importance for me was with Lourens Penning, then professor of neuroradiology and head of the department in Groningen. Lourens was a gifted and driven researcher and an accomplished illustrator, as well as being strongly interested in spinal morphometry and biomechanics. He imparted to me an understanding of the principles of spinal imaging, especially functional imaging, as well as of clinical research. Our co-operation was a fruitful one, as numerous joint references in this book attest.

I have been privileged to experience an era of almost bewildering change in the field of medical imaging. At the time of my arrival on the scene in 1976, the mainstays of cerebral diagnosis were still pneumoencephalography, the notorious air study, together with cerebral angiography, with subsidiary roles for brain isotope scanning and echoencephalography. In the spine, diagnosticians still relied heavily on plain X-ray films, with contrast myelography available to image the soft contents of the spinal canal and isotope studies to study CSF flow patterns and detect vertebral lesions.

Computed tomography (CT scanning) of the brain had recently been introduced, but was not generally available. Spinal CT would not become feasible until the advent of large-bore body scanners and high-resolution algorithms. When this did occur in the late-1970s, techniques such as epidural venography and peridurography, which had been introduced as attempted substitutes for myelography, quickly disappeared from the scene. Myelography was relegated to second place, but remained of value, usually in combination with CT.

The advent of magnetic resonance imaging (MRI) provided another great advance in imaging technology and image resolution. MRI has become the prime modality for diagnostic imaging of the brain and spine, and has proven to be superior in many ways to CT. To neurologists and neurosurgeons trained in the last twenty years, it seems almost incredible that neurological diagnosis could previously be achieved without access to these sophisticated imaging modalities. Yet this was actually the case, and while it is undoubtedly true that modern imaging has made life much easier for present-day diagnosticians and patients, it is also a fact that the application of this technology by itself has not provided answers to many important questions which still confront us.

This is also true in the diagnosis of lumbosacral radicular pain and related conditions such as neurogenic claudication. Whereas it is now possible to detect and
classify even the smallest disc herniation and measure accurately the dimensions of
the spinal canal, fundamental questions are still unanswered.

Much is still unclear about the pathogenesis of sciatica, but it has now become
obvious that there is more involved than simply “rupture of the intervertebral disc
with involvement of the spinal canal” as Mixter and Barr described in their historic
article in 1934. Inflammatory components have proved to play an important role. In
neurogenic claudication presenting in patients with lumbar spinal stenosis, vascular
factors appear to be at work beside compression of the cauda equina within the nar-
rowed canal. Functional spinal imaging in different postures has, however, helped us
to explain the posture-dependency of this complaint.

Lumbar disc herniations are frequently encountered by chance in individuals who
are not suffering and who will not suffer from symptoms attributable to these hernia-
tions. The prevalence of these incidentally-found herniations in the healthy popula-
ion is generally estimated at around 30%, though even higher percentages have been
reported! It is still not fully clear in which ways these asymptomatic herniations and
these individuals differ from morphologically similar herniations in patients who do
present with radicular symptoms. Radicular pain episodes tend to be self-limiting, and the presence of a herniated
disc causing radicular pain is not a mandatory indication for surgical therapy, as the
majority of these pain syndromes will show spontaneous remission. On the other
hand, the complaints can be persistent in a small minority of these and it would obvi-
ously be useful to be able to select such cases for early surgical therapy, thereby sav-
ing these patients an extended period of fruitless conservative therapy.

This book represents an attempt to formulate the beginning of an answer to some
of these questions. As a consequence of my neurological and neuroradiological back-
ground, I have chosen to focus on the assessment of the state of the nerve root. For
this reason, much attention is devoted to technical aspects and interpretation of MR
myelographic imaging.

Chapter 1 on the nature of radicular pain presents an overview of the evolution of
this concept, from a simple mechanical compression model to a complex phenomenon
with humoral and auto-immune inflammatory components, and featuring besides pain
by direct involvement of the nerve root, pain originating in spinal musculoskeletal
structures, which is referred via a central mechanism to the lower extremities.

In Chapter 2, lumbar spinal imaging techniques are reviewed, briefly discussing
methods formerly used and focusing on MRI with special attention to MR
myelography.

Chapter 3 deals with normal topographic and sectional spinal anatomy, with a sec-
tion devoted to functional imaging, describing the effects of postural changes on
normal spinal structures and dimensions.

Chapter 4 is devoted to pathologic anatomy and the way in which symptomatic
nerve root compression can come about. In this chapter as well as the next, case illus-
trations are captioned with a brief summary of the presenting clinical symptoms of
the patients illustrated.

Chapter 5 describes pre- and post-operative imaging, and attention is devoted to
features which may help to predict the natural evolution of radicular complaints in an
individual patient. In the same chapter, the presentation of various adverse post-
operative events is reviewed.

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