Dynamic Chiropractic

X-RAY / IMAGING / MRI

Advanced Imaging: What Shortcomings?

Arthur Croft, DC, MS, MPH, FACO

My column this issue concerns an editorial that ran on the front page of Dynamic Chiropractic in the December 16, 1994 issue: "New Study Questions Use of MRIs: Are they Responsible for Increased Surgery?" The writer of this piece cited a recent paper by Jensen et al.[1] which appeared in the New England Journal of Medicine. This paper was another in a line of similar studies that examined the issue of incidental findings of disc abnormalities seen on MRI studies in atraumatic and non-symptomatic subjects. These studies are particularly susceptible to misinterpretation. It reminds me of the joke about the statistician who drowned fording a river that had an average depth of three feet.

The first of such papers appeared in Spine in 1984.[2] The authors of that paper reported that in the over 40 age group, more than 50 percent of the CT scans of "normal" subjects were abnormal. The subsequent (and incorrect) spin applied to this statistic from various sources was that "50 percent of all normal people have a disc bulge or herniation." This statistical misinterpretation has become particularly popular with defense lawyers and insurance claims adjusters who often attempt to dismiss the significance of real disc lesions. However the "abnormalities" described by the original authors included, in addition to disc bulges or herniations, facet arthrosis and spondylosis -- normal consequences of aging that are typically found in asymptomatic persons in this age group. In fact, disc herniation was seen in only 19 percent in the under 40 age group. This is in line with other more recent studies that report such abnormalities in the range of 4-28 percent of asymptomatic subjects.[3] Most important however is the fact that these studies are somewhat artificial, lacking by their very design a fundamental component of the diagnostic equation -- namely that of clinical interpretation.

In the real world radiologists are not left strictly to their own devices in deciding the fate of low back pain sufferers. Nor do orthopaedic surgeons or neurosurgeons commonly place blind faith in the opinions of those radiologists or neuroradiologists when it comes to deciding whether to operate. The patient's subjective complaints, physical findings, and other objective testing, such as EMG or somatosensory evoked potentials, greatly influence such clinical decisions. And so while it is interesting to know the prevalence of benign disc bulges in the general population, we should not misinterpret these studies as meaning that such findings are generally clinically insignificant in low back pain sufferers and dismiss those patients with short shrift.

Other factors are certainly at play which will likely influence the relative importance of these MRI findings in patients. For example, none of these studies have attempted to correlate AP spinal canal diameter with the degree of disc bulging. Yet it is likely that a three mm bulge in a patient with spinal stenosis will be of greater significance than the same bulge in a person with a normal AP diameter. Moreover, there is evidence that disc herniation may be accompanied by an autoimmune reaction that could result in a type of chemical radiculitis. And there are probably many other factors influencing the relative importance of MRI in specific cases. Thus there may be important differences in discs that might otherwise appear similar in anatomical (CT or MRI) studies. This has been demonstrated in discography studies, for example, where it has been shown that not all

bulging discs are symptomatic despite their similar appearance on MRI.[4]

The Dynamic Chiropractic author also noted an editorial in the same edition of the NEJM by Richard Deyo, MD, MPH, that called attention to the concern that MRI may have actually increased the rate of certain types of spinal surgery. I don't doubt that this is true. I have seen many patients subjected to surgery strictly on the basis of CT or MRI findings. In several cases the physical findings were in my opinion equivocal at best. However those surgeons who put their patients' welfare first and who are honestly concerned with optimal outcome would hesitate to operate on such patients. MRI or CT findings should be considered only another piece in the overall diagnostic puzzle.

Allan and Waddell[5] have recently exposed "the dynasty of the disc," an ongoing entrepreneurial misadventure engaged in by orthopaedic surgeons and neurosurgeons alike that began with Mixter and Barr way back in 1939. Despite recent studies that show that the natural history of lumbar disc herniation is to resorb in 67 percent to 78 percent of the cases (although some patients remain symptomatic),[6-8] and studies that suggest that disc surgery offers no long-term advantage over conservative care,[9] the business of spinal surgery is thriving today, in fact it is on the increase.[10] And from the profession that institutionalized the argument against chiropractic that if you can't prove it with randomized controlled trials it doesn't count, we find that the evidence supporting most forms of spinal surgery is poor.[11] For example, for cervical spinal surgery (either fusion or laminectomy) for the condition of spondylotic myelopathy -- an operation performed over 20,000 times yearly -- there have been no randomized trials.[12] In fact, there is some evidence that the long term outcome is similar between surgical and non-surgical patients with this condition.[13]

In other cases, the results of trials should give surgeons and their patients reason to pause. For lumbar spinal fusion the pseudarthrosis rate is almost universally reported to be about 35 percent.[14-16] When performed for the condition of disc degeneration, the failure rate is a frightening 55 percent.[16]

The author of the Dynamic Chiropractic editorial also cited Dr. W.P. Butt[17] as saying that there is little justification for performing MRIs in cases of mechanical back pain (not that one can be entirely certain of that classification without the MRI) unless surgery is planned. Although I can't think of any surgeons today that "plan" surgery without the aid of CT or MRI, we must remember that Dr. Butt was writing for medical doctors whose approach to such conditions is either medical (i.e., treating with NSAIDS, analgesics, or other drugs) or surgical. In contrast to those who manage back pain merely with medicine, doctors who manipulate the spine often have a need to understand the precise configuration and condition of that anatomical region that rivals that of spine surgeons -- a fact that apparently escapes the grasp of some chiropractors. I might also add parenthetically that the lion's share of today's malpractice claims against chiropractors concern disc herniations.

Finally, the author of the Dynamic Chiropractic editorial offered the concluding advice that "the chiropractic practitioner would be wise to recognize the short comings [sic] of advanced imaging as compared to good, old-fashioned, clinical findings." I'm not sure I would agree with that recommendation. MRI provides clinicians with a unique and unparalleled look into the deepest recesses of the body which only a few decades ago were visible, in limited form, only to surgeons. It provides us with truly marvelous glimpses into both anatomy and physiology and promises to replace more invasive yet time-honored procedures such as angiography[18] and needle EMG.[19,20] It is

hard to imagine how knowing more about the nature of spinal disorders could ever be looked upon as a shortcoming. The shortcoming in the case of increased disc surgery is largely the result of an entrepreneurial misuse of new technology and we can blame only ourselves for this trend -- not our science. My own advice would be that readers not allow themselves to be unduly influenced by researchers suffering from excessive rationality. It is easy to become lost in the myopia of misinterpreted data.

References

1. Jensen MC, Brantzawadzki MN, Obuchowski N, Modic MT, Malkasian D, Ross JS. Magnetic resonance imaging of the lumbar spine in people without back pain. New Eng J Med 331(2):69-73, 1994.

2. A study of computer assisted tomography: I. the incidence of positive CAT scans in an asymptomatic group of patients. Spine 9(6):549-551, 1994.

3. Kent DL, Haynor DR, Larson EB, et al. Diagnosis of lumbar spinal stenosis in adults -- a meta-analysis of the accuracy of CT, MR and myelography -- review. Am J Roentgenol 158(5):1135-1144, 1992.

4. Linson MA, Crowe CH. Comparison of magnetic resonance imaging and lumbar discography in the diagnosis of disc degeneration. Clin Orthop 250:160-163, 1990.

5. Allan OB, Waddell G. A historical perspective on low back pain and disability. Acta Orthop Scand 60 (Suppl 234), 1989.

6. Ilkko E, Lahde S, Heikkinen ER. Late CT findings in non-surgically treated lumbar disc herniations. Europ J Radiol 16(3):186-189, 1993.

7. Ellenberg MR, Ross ML, Honet JC, et al. Prospective evaluation of the course of disc herniations in patients with proven radiculopathy. Arch Phys Med Rehab 74(1):3-10, 1993.

8. Bush K, Cowan N, Katz DE, et al. The natural history of sciatica associated with disc pathology. Spine 17(10):1205-1212, 1992.

9. Shvartzman L, Weigarten E, Sherry H, et al. Cost-effectiveness analysis of extended conservative therapy vs. surgical management in the management of herniated lumbar intervertebral disc. Spine 17(2):176-182, 1992.

10. Davis H. Increasing rates of cervical and lumbar spine surgery in the United States, 1979-1990. Spine 19(10):1117-1124, 1994.

11. Nachemson A. Low Back Pain. Are orthopaedic surgeons missing the boat? Acta Orthop Scand 64(1):1-2, 1993.

12. Rowland LP. Surgical treatment of cervical spondylotic myelopathy: time for a controlled trial. Neurology 42:5-13, 1992.

13. Clarke E, Robinson PK. Cervical Myelopathy: a complication of cervical spondylosis. Brain 79:483-510, 1956.

14. O'Beirne J, O'Neill D, Gallagher J, et al. Spinal fusion for back pain: a clinical and radiographic review. J Spinal Dis 5(1):32-38, 1992.

15. Grubb SA, Lipscomb HJ. Results of lumbosacral fusion for degenerative disc disease with and without instrumentation -- two year to five year follow-up. Spine 17(3):349-355, 1992.

16. Zdeblick TA. A prospective, randomized study of lumbar fusion -- preliminary results. Spine 18(8):983-991, 1993.

17. Butt WP. Magnetic imaging of the spine. Br J Rheumatol 33:793-797, 1994.

18. Turjman F, Tournut P, Baldy-Percer, et al. Demonstration of subclavian steal by MR angiography. J Comp Assist Tomography 16(5):756-759, 1992.

19. Uetani M, Hayashi K, Matsunaga N, et al. Denervated skeletal muscle -- MR imaging -- work in progress. Radiology 189(2):511-515, 1993.

20. Fleckenstein JL, Watumull D, Conner KE, et al. Denervated human skeletal muscle -- MR imaging evaluation. Radiology 187(1):213-218, 1993.

Arthur C. Croft, DC, MS, FACO
Coronado, California

JANUARY 1995