



THE CHIROPRACTIC REPORT

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Lumbar Disc Herniation – New Research and New Conclusions

A. Introduction

1. About 5% of patients seeking care for low-back pain will have a disc herniation.¹ For some surgery brings dramatic relief, for many others manipulation produces equally impressive results. There are few controlled trials - only one each for discectomy² and manipulation,³ and none comparing these two widely used approaches to management. There is a need for more clinical trials.

2. However there have been many case series and prospective studies reported in recent years, and a wealth of new research in a number of areas that affect management, such as:

- The anatomy and biomechanics of the disc and related structures.
- The causes and natural history of herniation.
- The relationship between herniation and the symptoms.

Modern imaging techniques, such as CT scanning (CT) and magnetic resonance imaging (MRI), are much more accurate and less harmful than those used in the past. This has allowed screening for disc herniation in well populations with no symptoms, which has led to the rather dramatic discovery that about 40% of people over age 40 are unsuspectingly going about their daily lives with disc herniations - but with no pain or other symptoms.⁴ Important questions are:

- a) When a patient presents with disc herniation and low-back and/or leg pain, what is the relationship, if any, between the pain and the herniation.
- b) Is disc herniation a surgical problem or, having regard to its natural history and other factors, is it best treated without surgery.
- c) In non-surgical management is chiropractic manipulation safe and effective.

3. This issue of the Report reviews two significant new articles:

- a) One from neuroradiologists in Italy giving the first extensive study of the natural history of disc herniation using magnetic resonance imaging (MRI) - and concluding that disc herniation should generally be viewed as a non-surgical problem.⁵

- b) One from doctors of chiropractic and an orthopedic surgeon in Canada - reviewing a large volume of recent research and concluding that "the treatment of lumbar intervertebral disc herniation by side posture manipulation is both safe and effective."¹

(For a full overview of chiropractic management of disc problems - see the May 1989 (Vol 3 No. 4) issue of The Chiropractic Report).

B. Spontaneous Reduction of Herniation

'Lumbar Disk Herniation: MR Imaging Assessment of Natural History in Patients Treated Without Surgery', Bozzao A, Gallucci M et al, *Neuroradiology* (1992) 185:135-141.

4. There have been several studies suggesting that disc herniations generally reduce in size over time. However these have been small studies, over periods up to three months only, and largely with patients under active care.

These studies, and various case reports, confirm that over three months some herniations do not change at all, even in patients experiencing complete relief of symptoms.

5. This new prospective study from the Department of Radiology, University of Rome, Italy, is the first to look at:

- a) A large number of patients receiving conservative care (i.e. no invasive care to remove or destroy the herniated material - surgery or chemonucleolysis).
- b) Over a longer term - average time between initial and follow-up imaging was 11 months.
- c) Using magnetic resonance imaging (MRI).

6. The patients in the study came from a consecutive group of 978 patients who received MRIs for back and/or leg pain at the University of Rome over two years. From these 978:

- 253 were found to have lumbar disc herniation.
- 120 of these were later chosen at random. 22 (18%) had been treated by surgery, 98 (82%) by conservative methods (bedrest, education, manipulation, physical therapy).
- 69 of the 98 treated without surgery

Professional Notes

ACA Cost of Care Analysis Project

'An Overview of the American Chiropractic Association Cost of Care Analysis Project', Stano M, *ACA Journal of Chiropractic* (March 1993) 30(3):41-45.

There is good evidence of the comparative cost-effectiveness of chiropractic management of soft tissue back injuries at work. This comes from many workers compensation studies. However there is little good evidence outside that important but limited area.

Enter the ACA Cost of Care Analysis Project. Like the ongoing RAND study, the ACA Project is a hugely important investment for the future of the chiropractic profession but is so comprehensive that it can be hard to grasp what exactly is happening.

Two years into the project a good overview has just been published by Professor Miron Stano PhD, the health economist leading the research project. The goals of the project have been to find and groom a large and sophisticated database, then have independent, expert analysis of the data to report on various cost comparisons including:

- The comparative costs of medical, chiropractic and joint medical/chiropractic

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agreed to follow-up MRIs. (The 29 who refused did so primarily on the grounds they had experienced a complete recovery).

These 69 patients formed the study group. 43 had experienced leg pain for 1-3 months before the first MRI, 26 had experienced lumbar pain for longer than three months.

7. On re-examination four of the 69 had new herniations at different spinal levels. Of the remaining 65, all treated conservatively:

- a) 31 (48%) had spontaneous reduction of disc herniation (RDH) higher than 70%.
- b) 10 (15%) had RDH between 30-70%.
- c) 19 (29%) had no appreciable change.
- d) 5 (8%) had an increase in the size of the disc herniation.

In summary, 63% (41) had a natural reduction of size of disc herniation of 30% or more, and only 8% (5) an increase.

Correlations

8. There was no relationship found between the natural history of the herniation (i.e. whether or not it had reduced or increased in size at repeat examination, and by how much) and:

- a) **Age.** Ages varied between 23 and 65.
 - b) **Location of herniation.** 36 were posterolateral, 21 median, and "8 involved the neural foramen".
 - c) **Continuing symptoms or clinical results.** (71% of patients re-examined had good clinical results under conservative care. This improves to 80% if you add in the 29 patients chosen who refused to participate in the study on grounds of complete improvement).
 - d) **Time between the MRI studies.** This varied from 6 to 15 months, with an average time lapse of 11 months.
9. The one positive correlation found was between the initial size of herniation and the degree of reduction - the largest herniations had the largest spontaneous reduction in size over time.

Conclusions

10. The authors conclude that "lumbar disc herniation is primarily a non-surgical disease" that should be treated by conservative methods. This study shows that 82% of patients with disc herniation are being treated conservatively at the University of Rome, with good results. There is no detailed discussion of the methods of conservative care given. Most patients received bedrest for two weeks then "manipulation or therapy".

11. The exact causes of RDH or shrinkage of the disc material remain unknown. There is discussion of the probable causes which include:

- Resorption (related to the lack of nutrients supplied by the disc).
- Desiccation (due to the lack of hydrophilic proteoglycans).
- Phagocytosis (stimulated by the inflammatory response to the acute phase of disc herniation).

The authors observe that "on the basis of our findings regression of large herniations into the annulus seems unlikely."

12. Bozzao et al discuss the source of pain with disc

herniation. It is not the pressure of herniated material on nerves but root sleeve edema and other inflammatory responses around the disc material.

C. Manipulation for Disc Herniation

'Side Posture Manipulation for Lumbar Intervertebral Disk Herniation', Cassidy JD, Thiel HW, Kirkaldy-Willis KW (1993), JMPT 16(2):96-103.

13. This is a literature review of great clinical and legal interest because of:

- a) Its conclusion - that, given by professionals with appropriate training and skill, "the treatment of lumbar intervertebral disk herniation by side posture manipulation is both safe and effective".
- b) The weight of evidence behind that opinion, which includes much new experimental and clinical research.
- c) The reputations of the authors. Principal author is David Cassidy DC PhD, Director of Research, Department of Orthopaedics, University of Saskatchewan, Canada's most published and leading authority on joint manipulation. Haymo Thiel DC is an experienced clinician and researcher, now on the faculty of the Anglo-European College of Chiropractic, Bournemouth, England.

William Kirkaldy-Willis MD FRCS (E and C), is Professor Emeritus, Department of Orthopaedics, Royal University Hospital, Saskatoon, and Past-President of the American Back Society and the International Society for the Study of the Lumbar Spine. His text, 'Managing Low Back Pain', now in its third edition,⁶ has had a huge influence internationally in the way the medical and chiropractic professions are looking at the causes and management of low-back pain.

Mechanisms of Herniation

14. Cassidy et al report that the literature now supports two basic mechanisms of disc herniation, illustrated in Figure 1:

- a) **Sudden prolapse.** This occurs as a result of a sudden load or force on the disc while the spine is in flexion. This is the type of disc herniation seen in many industrial lifting injuries.
- b) **Gradual prolapse.** Repetitive or prolonged loads fatigue the outer annulus of the disc. The annulus creeps over time at its weak points, the posterior boundaries, and finally herniates.

Disc herniation may be contained (where there is protrusion but the outer annulus remains intact) or uncontained (where the contents of the nucleus completely penetrate the annulus and prolapse into the vertebral canal).

Reasons why rotational manipulation does not damage discs

15. Some researchers, such as Farfan,⁷ have suggested that rotational stress (torsion) causes disc failure. On a careful analysis of their work and new evidence, Cassidy et al disagree. Reasons include:

- a) Farfan's work shows that normal discs withstand an average of 23° of rotation before failure, degenerated discs 14°.

However the posterior facet joints in the lumbar spine only allow about 2-3° of rotation. Failure of the disc from rotational force (torsion) could only arise following fracture of the facets.

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treatment, generally and for matched, objectively defined disorders.

- Nationally and on a state-by-state basis.
- For the first time, a comparison of medical costs per person in private insurance plans with and without chiropractic benefits - to see if adding chiropractic benefits reduces utilization of medical services and actually reduces overall cost of the system (i.e. if chiropractic acts as a cost-effective substitute rather than an add-on, and plans with chiropractic benefits can save money overall).

Current Developments

a) The research team is led by Miron Stano PhD from Oakland University, Rochester Michigan, a 1971 graduate of Cornell University. Other members include Jack Ehrhart MD MPH, of Shared Medical Systems, Malvern, Pennsylvania, and Thomas Allenburg DC, President, American Chiropractic Network, Minnetonka, Minnesota.

b) An excellent database has been found and adapted. This is owned by MEDSTAT Systems Inc., Ann Arbor, Michigan, a private health benefits management consulting firm with many large corporate clients. This tracks fee-for-service care for over two million patients throughout the US.

A year of work has established a database for 396,000 patients who received treatment from a provider (DC, DO, MD) for one or more of 493 ICD-9 Code neuromusculoskeletal (NMS) disorders over the two year period July 1988 to June 1990. The group includes 93,000 patients who used chiropractic services. Most insurance plans in the database include chiropractic benefits, some do not, allowing for comparisons.

Stano describes the database as "extraordinary" in terms of size and scope of information on each patient, and "clearly the most comprehensive information available to the chiropractic profession on cost and treatment of NMS disorders". (The database also has claims

history of 35,000 chiropractic patients who received care for somatovisceral disorders).

Significant Findings

Important findings from initial analysis of the data include:

- 23% of the 396,000 patients received chiropractic care (with or without medical care) during the two year period - to quote Stano, "the chiropractic presence is extremely important for NMS disorders".
- Over all 493 ICD diagnostic codes for NMS disorders, and on analysis of a number of specific codes, medical costs are approximately 30% higher than chiropractic costs. This is largely because of higher hospital admission rates (53% higher) and inpatient costs (73% higher), but outpatient medical costs are higher than chiropractic costs also.

c) Average chiropractic outpatient costs per patient over the two year period were \$558, but notably this cost "was offset by lower payments for outpatient medical care and for other outpatient services" for these patients.

According to Stano, "the picture that emerges is one in which chiropractic use reduces the need for other forms of care ... this national pattern was confirmed by analyses within smaller geographic units at the state or census division".

d) Stano notes that there is much breakdown and analysis yet to be performed, but concludes that current evidence suggests that chiropractic care substitutes cost-effectively for other forms of care, and that "eliminating or reducing the chiropractic benefit (in an insurance plan) may increase insurance payments".

e) Another separate finding of great interest is that, although chiropractic has such a strong presence in the management of neuromusculoskeletal disorders, total payments to chiropractors represent less than 2% of all insurance payments. This fact allows two important conclusions:

- "There cannot be any basis to allegations that expenditures on chiropractic care are an important contributor for recent rapid increases in insurance premiums."
- "The relatively small payment to chiropractors indicates that the elimination of the chiropractic benefit offers minimal potential for insurance savings."

Finally, Stano's overview in the ACA Journal of Chiropractic references the publications generated by the ACA project to date - these include an article titled 'The Growing Role of Chiropractic in Health Care Delivery', by Stano, Ehrhart and Allenburg in the November/December 1992 issue of the Journal of American Health Policy (Vol 2 No. 6). (Reprints available from Mattie Steward, Circulation Manager, Faulkner & Gray, Healthcare Information Center, 1133 15th St., N.W., Suite 450, Washington, DC 20005. 800-848-1153 or 202-828-4150, US\$7.00 each).

The Chiropractic Form and Sample Letter Book

By Louis Campbell JD, Jacob Ladenheim JD, Robert Sherman JD and Louis Sportelli DC, Health Services Publications, Fincastle Virginia (1993).

- What are the best forms available for recordkeeping, consents, dealing with attorneys and third party payors? Where can use of forms help - or hurt? Are there good sample letters - to collect debts, to write to patients, to start up or respond to referral of patients?

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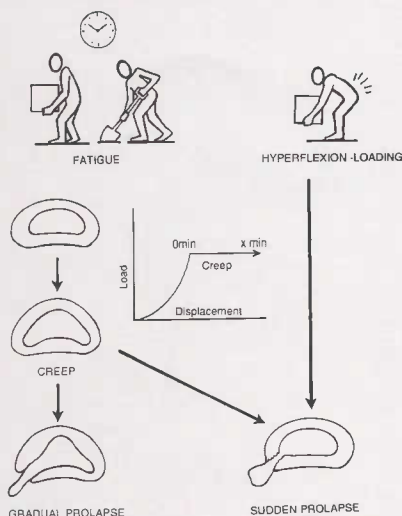
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Figure 1

Mechanisms of Herniation



State Farm on Chiropractic

'Chiropractic: An Update', Medi-Claim (November 1992, Vol 13 No.4:1-8).

State Farm, like all other large insurers of health care, has sophisticated and well-funded research and communications. Its General Claims Department produces a quarterly newsletter Medi-Claim, for its claims personnel throughout North America. The November 1992 issue was devoted entirely to the chiropractic profession under the heading 'Chiropractic - An Update'. What is being said about you?

The newsletter is refreshingly informed, fair and positive as it discusses history, theory and principles, educational requirements, scope of practice, effectiveness and current professional developments. For example,

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"The basic difference between chiropractic school and medical school is that medical schools provide full instruction in surgery and pharmacology. Since chiropractors neither prescribe medicine nor perform surgery, chiropractic schools devote those hours to chiropractic principles and specific manipulative techniques. Medical schools, as a rule, neither require nor offer courses on manipulation or manipulative therapy. The intensive courses required by chiropractic physicians in the doctoral phase of their education closely parallel those of medical school."

And again:

"The corrective structural adjustment by a chiropractic physician should not be confused with other forms of manipulation. Manipulative therapy in one form or another is used in all the healing arts. Allopathic manipulation is usually little more than putting a joint through its normal range of motion, by a therapist, in order to stretch muscles and break adhesions (usually called mobilization). Osteopathic manipulation is designed to increase joint motion and relieve fixations.

On the other hand, chiropractic corrective adjustment is made only after careful analysis, delivered in a specific manner, to achieve a predetermined goal. It is a precise, delicate manoeuvre, requiring special bio-engineering skills and deftness not unlike that required for other specialties. Rarely is the process painful. The RAND study (referred to later) found that 94% of all manipulation was applied by doctors of chiropractic, with the remaining 6% shared among orthopedists, osteopaths and physical therapists."

Why is State Farm so interested, and why the tones of honest enquiry and acceptance? As the conclusion notes, chiropractic is now large, licensed throughout North America, and it is estimated that "7% of the US population use chiropractors at an estimated cost of \$3.3 billion annually."

In addition:

"Chiropractors have enhanced their profession by emphasizing specialization ... and a significant commitment to research and development of standards for quality of care."

This is positive fall-out from the profession's commitment to research in recent years, most particularly the RAND studies and the Mercy Center Consensus Guidelines, both of which are discussed in detail with approval.

New Practice Guidelines Established in

Canada

Nationally based practice guidelines were established in the United States in 1992. (Guidelines for Chiropractic Quality Assurance and Practice Parameters, ed Haldeman S et al, Aspen Publishers, Gaithersburg, MD, 1993). At the Glenierin Inn, Toronto, April 4-7, 1993

following a formal consensus process similar to that used in the United States, new Canadian guidelines for chiropractic practice have now been established.

The process was administered by the Canadian Chiropractic Association through its Practice Guidelines Committee, chaired by Dr. Donald Henderson of Toronto. It was funded by the CCA and the Canadian Chiropractic Protective Association, the largest chiropractic malpractice protection agency in Canada. It is expected that the proceedings of the Glenierin Conference, including the Canadian guidelines themselves, will be published and available by November, 1993.

There is good consistency between the US and Canadian sets of guidelines in all fundamental areas, such as diagnosis, modes of care, frequency and duration of care, and contraindications. This is important to the credibility of both. Clinical guidelines are based on two bodies of knowledge, the published literature and clinical experience. Markedly different interpretations in the US and Canada would have revealed flawed analysis and conclusions, and would have been quickly exploited by insurers and others active in the health care marketplace throughout North America.

The new Canadian guidelines, in addition to all areas of practice covered in the US guidelines, have guidelines on practice advertising and an extensive glossary of definitions.

Long-Term Care - Supportive v Maintenance

The term 'maintenance' care, often used to describe all long-term chiropractic care, is widely misunderstood and often a red flag to third party payors.

Both the US and Canadian guidelines adopt the following important classification which should now become standard in the profession:

- **Supportive Care:** Long-term care that is therapeutically necessary. It is treatment for patients who have reached maximum therapeutic benefit, but who failed to sustain this benefit and progressively deteriorate when there are periodic trials of withdrawal of treatment.

- **Maintenance Care:** Long-term elective care. By definition it is not therapeutically necessary. With patients who have required initial therapeutic care, this is long-term care after maximum improvement without trial withdrawal of treatment. With patients who commence care on an elective basis without symptoms and to promote health and prevent future problems, maintenance care can also be called 'preventive/maintenance care'.

Orthopedic Surgeons and Low-Back Pain

'Low-Back Pain: Are Orthopedic Surgeons Missing the Boat?', Guest editorial, Nachemson A (1993), *Acta Orthop Scand*, 64(1):1-2.

Injection of chymopapain, having regard to

modest success rate, cost and frequency of complications, is now discredited in the management of disc problems and back pain. Surgery is often inappropriate for the same reasons, and should be confined to a small group of patients with clear indications.

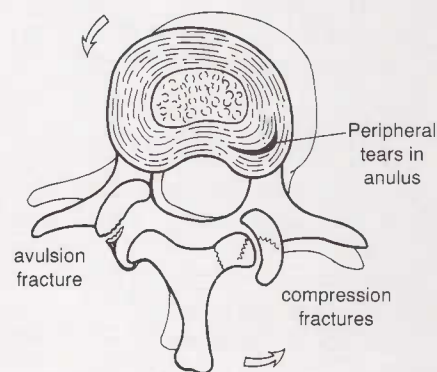
In this guest editorial from Scandinavia, a leading theater for research into the management of back pain, Alf Nachemson, MD PhD from Gothenburg, Sweden:

- Concludes that orthopedic surgeons are missing the boat on low-back pain - failing to provide the scientific evidence and results of other specialists including chiropractors.
- Observes that the "enormous increase" in imaging technology during the last decade has focused on anatomic changes "which often have no importance at all for the patient's pain".
- Complains that "new surgical methods are constantly being introduced and presented in uncontrolled case series. Orthopedists, trained for surgical solutions, are too quick to use the new screws hooks, pins and needles, promoted by the inventors and the instrument companies despite mediocre results and many complications."
- Given "the potential risks of our interventions with various ingenious contraptions for the lumbar spine", and given "the lack of clinically proven success" he calls for "a moratorium on unproven invasive methods for the treatment of chronic low-back pain. The only reason to lift this moratorium should be prospective randomized trials of surgical methods, both old and new."

Nachemson points out that, prior to the discovery of disc herniation as a cause of sciatica in the 1930s, back pain did not belong to the field of orthopedics. The role of orthopedists now should be comparatively minor, and there should be much greater interdisciplinary cooperation with psychologists, chiropractors and others if the back pain epidemic and its "sky-rocketing costs in all the industrialised countries" are to be controlled.

Figure 2

Mechanisms of Injury from Torison (Rotation)



b) When researchers such as Farfan, working experimentally rather than with patients, have shown disc failure from torsion, the failure is in the form of peripheral tears in the annulus rather than prolapse or herniation. (See Figure 2).

c) The structure of the lumbar disc is well suited to resist rotational forces. The collagen fibers in the annulus cross "in successive layers tilted at 60-70° from the spinal axis". They are so arranged that during "the coupled motions of lateral bending and rotation, half of the annular fibers are placed under a tensile stress" while the others are not. The disc provides "more resistance to torsion than to other directions of force."

Flexion results in more displacement and higher internal pressures in the disc than torsion. (Fuller details of the experimental evidence are given in tables).

16. The authors conclude that in most circumstances "it is hard to comprehend how the small amount of rotation introduced during side posture manipulation could damage or irritate a healthy or herniated disc."

Cause of pain

17. Cassidy et al agree with Bozzao et al (see para 4 above) that pain from disc herniation is primarily from inflammation (auto-immune inflammatory reaction to nuclear material entering the epidural space), not the direct pressure of nuclear material on the nerve root. They note:

- a) Recent animal studies have confirmed the inflammatory effect of the nucleus and the presence of immunoglobulin G in the disc.
- b) Many disc herniation patients with sciatica who go to surgery have swelling and inflammation around the nerve root regardless of the size or extent of the disc herniation.
- c) In their clinics they "have noticed little to no correlation between the size of the herniation and the patient's symptoms or response to manipulative therapy."

They conclude that:

- Pain from disc herniation is due to inflammation.
- Other neurological signs when present, such as loss of sensation, motor power and reflex, are the result of nerve compression.

Effectiveness of manipulation

18. The authors review the literature and state that, while the reasons for success remain unclear, "the efficacy of side posture manipulation for lumbar disc herniation has been established." The research includes:

- a) A controlled trial by Nwuga³ showing that lumbar side posture rotation manipulation was superior to conventional conservative medical care (physical therapy, comprising heat, exercise and postural education). At six weeks follow-up manipulated patients showed significantly greater improvement of spinal mobility and straight leg raising than patients in the physiotherapy group.

The trial population comprised 51 consecutive patients with disc protrusion confirmed by myelography and electrodiagnosis. All were experiencing back pain and pain and/or numbness to the leg arising from reflex changes apparently associated with root compression.

- i) The study group of 25 received rotational lumbar manipulation and back education 3 times weekly for 4 weeks. The comparison group of 26 received conventional physical therapy department care (diathermy (heat), exercises, and back education) at the same frequency over the same period of time.
- ii) Pre and post (at six weeks) treatment measurements were made for various ranges of lumbar spinal motion (flexion and extension, total side flexion, total lumbar rotation) and straight leg raising.
- iii) Prior to treatment there was no significant difference between the two patient groups on any of these parameters. Following treatment those receiving manipulation showed a statistically significant improvement on all measures compared with those

receiving conventional medical therapy. It was concluded that manipulation was the superior treatment.

b) Several prospective studies⁸⁻¹² showing that 50-80% of patients with lumbar disc herniation are relieved by side posture manipulation. The largest, by Kuo and Loh,¹¹ involved a series of 517 patients over an eight year study period. All had a diagnosis of lumbar disc protrusion and were referred for manipulative therapy. 77% had a favourable response, defined as relief of pain at least to the extent that the patient could perform daily activities of living.

c) Cassidy et al also report on a recent series of 14 patients at their outpatient clinic. For these:

- i) All received side posture manipulation for lumbar disc herniation with a view to reducing pain through improved mobility of the spine.
- ii) 14 of the 15 obtained significant clinical improvement and relief of pain after a 2-3 week course of manipulation.
- iii) CT scans before and three months after treatment showed that in most cases, notwithstanding clinical improvement, the appearance of the disc herniation remained unchanged.
- iv) These results are consistent with those in a similar study recently performed in France.¹²

Level of Skill

19. Cassidy et al emphasize the need for appropriate professional training and skill and warn that "subtle variations of manipulative techniques can be important in the treatment of disc herniation." In particular:

- a) Patients with nerve root entrapment from herniation respond best to manipulations that maintain lumbar lordosis. Pre-positioning should allow for manipulation with minimal force or thrust. Conversely, manipulation that flexes and/or compresses the lumbar spine should be avoided. Ischial contact pelvic manipulations, which do both, can aggravate disc herniations.
- b) Mobilizing the segment back and forth through passive range of motion is "an important and necessary" preliminary to manipulation. If mobilization increases distal leg pain or the patient cannot tolerate it, it is wrong to proceed to manipulation at that time. In severe cases the first few manual treatments should involve mobilization without manipulation. In cases where manipulation increases leg pain and neurological deficit it should obviously be discontinued. In the rare cases where saddle anaesthesia or bowel or bladder dysfunction develop, the patient should be referred for surgical assessment.

(The review, which is limited to side-posture rotational manipulation, doesn't describe in detail other accepted forms of chiropractic manipulation, such as flexion-distraction techniques. The authors emphasize that manipulation is only one part of management, which may include use of ice, electrotherapy, back school and increasing levels of exercise. A light elastic support may be valuable to reduce pain, increase confidence and enable the patient to become active more quickly).

How does manipulation work

20. Cassidy et al acknowledge this remains unclear, and there is no detailed discussion.

In summary:

- a) Since the work of Mathews and Yates¹³ in England in 1969 there have been suggestions that manipulation may reduce the size of the herniation, creating pressures that draw some of the herniated contents back into the disc. This explanation always had logical difficulties. Why wouldn't the disc re-herniate after treatment when normal weight bearing and activity were resumed? Larger and more recent studies, with better imaging, suggest manipulation has no effect on the size of the herniation. There is no correlation between clinical results and size before and after treatment, and some patients with excellent results after manipulation have unaltered, large herniations.

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- b) It may be that increased motion allows the inflammation already discussed (see para 17) to subside more easily.
- c) Manipulation may provide input to functional reflexes, modifying pain.
- d) Maybe the focus on the disc itself is too narrow, the facets are the most significant source of pain, and manipulation has its greatest impact there. With regard to this:

i) There are three points of contact between each pair of vertebrae - central contact at the disc and, towards the back on each side, contact at two facet joints - there is a 'three joint complex' to use Kirkaldy-Willis' terminology. Loss of height and normal mechanics at the disc inevitably alter function at the facets. These are richly innervated with pain sensitive nerve fibers, much more so than the disc.

Where there is disc degeneration there will likely be facet degeneration. Pain may arise from any or all of the three elements in the three joint complex.

ii) Mooney and Robertson,¹⁴ reporting on 100 consecutive cases of sciatica treated with facet blocks, have demonstrated that the lumbar facet joints can give rise to symptoms indistinguishable from those ascribed to disc herniation. Many observers feel that correction of overlying posterior joint dysfunction is the most likely mechanism by which manipulation helps symptoms in cases of disc herniation.^{15,16,17}

iii) An interesting eye witness account comes from Chrisman et al¹⁰ who performed side posture lumbar manipulations during disc operations to observe the effects directly. They report:

"Neither the nerve root nor the disc protrusion moved perceptibly, but the laminae moved apart by as much as 5mm markedly stretching the lower fibers of the ligamentum flavum and the superior lateral joint (facet) capsule."

Strong movement at the facets, none at the disc.

D. Conclusion

21. There has been a radical change in management of pain from disc herniation during the past 10 years. 10 years ago:

- a) Disc herniation, confirmed on imaging studies, was generally regarded as an indication for surgery.

Today it is not. It is known that the herniation may have little or nothing to do with the patient's pain. A decision to operate must be based on clinical factors. Generally there should be non-surgical management unless there is major or progressive neurological deficit.

- b) Few medical leaders regarded chiropractic manipulation as appropriate. Today such skilled manipulation is accepted as safe and effective for the great majority of patients with disc herniation. All published medical manipulators, such as Bourdillon and Day in Canada,¹⁶ Maigne in France,¹⁸ and Lewit in the Czech Republic,¹⁷ agree. They support the view that most pain probably comes from related facet subluxation (blockage or dysfunction). In the words of Lewit, a neurologist:

"In disc prolapse concomitant blockage may cause the patient's condition to deteriorate considerably, so that after treatment of the blockage the clinical condition may be greatly improved. To what extent this can happen cannot be easily foretold, but it is always worth trying provided we use the right technique".

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