

Australasian Musculoskeletal Medicine



- Why I pursue discogenic pain
- Coccygeal pain
- Evidence-based guidelines improve performance measures in orthopedic outpatients for low-back pain
- Imaging strategies for low-back pain
- Sustained segmental post-isometric relaxation

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Editorial

The Australian Association of Musculoskeletal Medicine (AAMM) has its 38th annual scientific meeting (ASM) as another combined conference with the Australasian Faculty of Musculoskeletal Medicine (AFMM) 17-19 July 2009 at the Marriott Resort and Spa, Surfers Paradise, Queensland.

Mastering Shoulders and Hips focuses on epidemiology, pathophysiology, and assessment highlighting the importance of history and physical examination, and relevant imaging when it is indicated by these, such as in the case of significant trauma or if other red flag indicators are present. Professional sports people may wish to leave no stone unturned, and imaging findings in younger patients may be more relevant to their presentations. Exercise prescription and other conservative evidence-based management will be explored, as well as interventional procedures and surgery, with an emphasis on new and emerging therapies examined in detail.

Michael Oei's AAMM President's Report has full details of developments. Michael worked tirelessly with Michael Yelland, Geoff Harding, Philip Watson, Chris Homan and Thomas Choong to organize the conference. Kate Ryall, Dianna Crebbin and the rest of the team from DC Conferences have provided their expert services once again. Thanks to all for another great job very well done.

The Australian Pain Society (APS) 29th Annual Scientific Meeting celebrated the 30th Anniversary of the APS at the Sydney Convention and Exhibition Centre 5-8 April 2009. The theme was **The Pain Continuum: Making Pain History**. The next meeting will be a combined effort with the New Zealand Pain Society at the Gold Coast in March 2010.

The AFMM will hold a winter retreat at the beautiful Cha-teau Tongariro on Mt Ruapehu, Tongariro National Park, in the south of the North Island of NZ, 12-14 August 2009, commencing at 9 am on the 12th.

Spine in Action: Low Back Pain – Can Chronic be Prevented? will be held at the Rendezvous Hotel in Auckland NZ 26-30 March 2010. Invited speakers include Professors Lars Arendt-Nielsen, Johan Vlaeyen, Jacob Patijn, and Paul Watson.

NZAMSM President Gary Collinson provides more details about this in his report and an update on the latest developments on the NZ scene. Please read his report in this edition of the journal.

Professor Nik Bogduk explains when and why he pursues a diagnosis of discogenic pain, and discusses the utility of this, when it may be indicated, and other considerations. He again examines the disappointing results and lack of efficacy of multidisciplinary pain treatment as practised by pain clinics in Australia and internationally. The patients are told that there is nothing wrong with them medically, or that they did once have nociception, but that has now ceased, and now they have only a "memory" of that pain. They are told medical treatment will not help, and the only prospect of treatment is behavioural and physical rehabilitation. But that treatment does not work, the patients still have pain. They are told there is nothing wrong. They fail rehabilitation, and the only recourse is to repeat it. The evidence in this very important area is examined and the alternatives explored. Internal disc disruption is elucidated. Reported high rates of false positives for discography in some papers

can be attributed to small sample sizes, and lack of adherence to the recommended International Spinal Intervention Society (ISIS) criteria for disc stimulation involving anatomic controls at adjacent levels, and manometric criteria of 15 pounds per square inch (psi) applied. Modic changes and high intensity zones (HIZs) on MRI are discussed. Intradiscal electrothermal therapy (IDET) is revisited and future directions examined.

David Vivian has provided a very nice overview of coccygeal pain, looking at assessment with history, with an emphasis on red flag indicators, examination, imaging when indicated, and management options which may include local anesthetic and steroid injection, prolotherapy, and possibly surgery.

Brian McGuirk has demonstrated how evidence-based guidelines improve performance measures in an orthopedic outpatients department. Orthopedic surgical outpatient departments are often overwhelmed by patients referred with low-back pain. Waiting lists for surgical consultations in this department were reduced substantially, as was the duration of waiting time to be seen, and the growth of waiting lists for surgery. The National Musculoskeletal Medicine Initiative guidelines were used.¹ Evidence-based guidelines for the management of low back pain emphasize the need for explanation, assurance, activation, and the avoidance of passive treatment and the use of investigations unless red flag indicators based on history and examination are present.^{1,2} The required management is predominantly medical, not surgical in nature.

I have reprinted a recent systematic review and meta-analysis highlighting the lack of utility of imaging for low back pain in the absence of red flag indicators in the history and examination.³ This has been reprinted from the *Lancet* with the kind permission of the publishers.

This applies to acute and subacute low back pain but the evidence is less strong for chronic low back pain,³ where MRI certainly can have a role to play when precision diagnosis may be indicated. This is explored in Professor Bogduk's paper in this edition on discogenic pain and elsewhere.²

All trials reviewed³ excluded patients with features suggestive of a serious underlying condition, but exclusion criteria varied (see table 2 in our reprint), and trials did not indicate the number of patients excluded because of such factors. It is important to realize that patients aged over 50 years were usually excluded, as were those who had used oral or sometimes other steroids, as well as anyone with substantial trauma. These are risk factors for osteoporotic compression fracture which account for up to 4% of cases of low back pain in primary care, usually in the absence of any history of trauma (sensitivity for history of trauma is only 0.30).⁴ It echoes previous studies such as the paper by Kendrick et al. published in the *BMJ* in 2001.⁵

The authors in this study similarly concluded that radiography of the lumbar spine in primary care patients with low back pain of at least six weeks' duration was not associated with improved patient functioning, severity of pain, or overall health status but was associated with an increase in doctor workload. They suggested that guidelines on the management of low back pain in primary care should be consistent about not recommending radiography of the lumbar spine in patients with low back pain in the absence of indicators for

serious spinal disease, even if it has persisted for at least six weeks. Patients receiving radiography were more satisfied with the care they received, and in fact 80% of these patients were still keen to have radiography if given the choice, despite being informed about the lack of utility of routine imaging. The authors felt that a big challenge for primary care was to increase satisfaction without recourse to radiography.⁵

It is difficult if patients are then referred to orthopedic surgeons or clinics requesting imaging and results, still entrenched in the biomedical model. These clinics also have input into the training of medical students, junior doctors, and allied health professionals who then seem to hold a similar world view that is in fact discordant with the evidence base. Hence the importance and relevance of Brian McGuirk's paper mentioned above and published in this edition of the journal.

The *Lancet* paper reinforces the recommendations from the Australian National Musculoskeletal Initiative¹ and the modified Evidence-Based Guidelines for Acute Musculoskeletal pain published in 2003 on the NHMRC website^{6,7} after the Initiative results were suppressed for political reasons.

James Watt has undertaken an impressive case series study to test the efficacy of a specific mobilization technique, sustained segmental post-isometric relaxation (SSPIR) for the management of chronic somatic cervical spinal pain with very promising results that should ideally be further evaluated with a randomized controlled trial.

There are some abstracts from the recent literature and comment which I hope readers will find stimulating and informative. Various links or references to the free full paper should be valuable to interested readers. Included are a number of recent papers concerning natural history, assessment, and management, and prognosis for cauda equina syndrome, an important red flag condition that should be considered in any patient presenting with low back pain, radicular features, or urinary symptoms or signs. Any feedback on these abstracts and comments is welcome.

Michael Oei retires as president at the AGM of the association at the Gold Coast. Michael has done a wonderful job steering the musculoskeletal ship in these difficult times and is to be highly commended for his wisdom and diligence.

Geoff Harding takes over as president at the AGM. Thanks very much Geoff. He is still the onsite co-ordinator in Australia for the Ottago Diploma of Musculoskeletal Medicine.

Margaret Taylor, our treasurer, has again coordinated Educational Activities. Thanks for all your wonderful efforts Margi, ably assisted by your assistant Martin Tucker with the book keeping and the many assorted membership issues.

David Vivian continues as co-editor of the journal but may need assistance when I retire after this edition.

Victor Wilk continues his invaluable role as web master, stalwart for the association, and committee member. Thanks very much Victor for all of your efforts.

A recent editorial in the *Medical Journal of Australia (MJA)*⁸ and paper in *Spine*⁹ has cast aspersions on the AAMM. The *Spine* paper mentions the AAMM specifically in a negative fashion and then berates doctors with a special interest in back pain for promoting bed rest and imaging in simple low back pain. Yet it says that after adjusting for special interests and recent CME there were actually no important

differences in back pain beliefs between those with and without a special interest in musculoskeletal medicine. It sounds quite contradictory and based on questionnaires from 1997, 2000 and 2004 that no one either I or the committee has contacted has any recollection of ever seeing. Purported interest in low back pain clearly does not equate to interest in musculoskeletal medicine, nor to postgraduate diplomas and masters degrees and Fellowships in musculoskeletal medicine. Bed rest has not been recommended by any musculoskeletal medicine groups in Australia or New Zealand in living memory. Musculoskeletal medicine led the way with recommending activity prior to the release of any guidelines on back pain recommending the same. Light activity has been a central tenet of the Indahl papers published in *Spine* in the 1990s,^{10,11} reinforced by the Australian National Musculoskeletal Medicine Initiative¹ and the NHMRC.^{6,7} The AAMM and other musculoskeletal medicine organizations continue to highlight the lack of utility of lumbar spine imaging in the absence of red flag indicators. Strongly recommended again is the red flag checklist, validated for acute and chronic low back pain.^{1,2}

Evidence-based teaching has been central to presentations at our annual scientific meetings and in our postgraduate courses through the 1990s to the present day.

These abstracts and further comments are recommended reading in this edition of the journal.

1. McGuirk B, King W, Govind J, Lowry J, Bogduk N. Safety, efficacy, and cost-effectiveness of evidence-based guidelines for the management of acute low back pain in primary care. *Spine* 2001; 26:2615-22.

2. Bogduk N, McGuirk B. *Medical Management of Acute and Chronic Low Back Pain. An Evidence-Based Approach*. Amsterdam; Elsevier, 2002.

3. Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet*. 2009. 7; 373: 463-72. Review.

4. Deyo RA, Rainville J, Kent DL. What can the history and physical examination tell us about low back pain? *JAMA* 1992; 26: 760-65.

5. Kendrick D, Fielding K, Bentley E, Kerslake R, et al. Radiography of the lumbar spine in primary care patients with low back pain: randomised controlled trial. *BMJ* 2001; 322:400-405.

6. Evidence-based Management of Acute Musculoskeletal Pain. CP94. 2003. NHMRC. http://www.nhmrc.gov.au/publications/synopses/_files/cp94.pdf

7. Evidence-based Management of Acute Musculoskeletal Pain – a guide for clinicians. CP95. 2003. NHMRC. http://www.nhmrc.gov.au/publications/synopses/_files/cp95.pdf

8. Briggs AM, Buchbinder R. Back pain: a National Health Priority Area in Australia? *Med J Aust* 2009; 190: 499-502.

9. Buchbinder R, Staples MP, Jolley DJ. Doctors with a special interest in back pain have poorer knowledge about how to treat back pain. *Spine* 2009; 34: 1218-26.

10. Indahl A, Velund L, Reikeraas O. Good prognosis for low back pain when left untampered. A randomized clinical trial. *Spine* (Phila Pa 1976). 1995; 20: 473-77.

11. Indahl A, Haldorsen EH, Holm S et al. Five-year follow-up study of a controlled clinical trial using light mobilization and an informative approach to low back pain. *Spine* (Phila Pa 1976). 1998; 23: 2625-30.

- David Roselt

From the AAMM President

As I am approaching the end of my term as president of the AAMM, I am sorry to say that musculoskeletal medicine in Australia as well as world wide has not made any inroads for specialty recognition. Musculoskeletal medicine is going through a difficult time in attracting new members. Unless there is a career path at the end of the training and better Medicare rebates, it will be difficult to entice our younger GP colleagues to commit their time and money to do any MSK postgraduate training. Currently the Association is too small a group to have any real bargaining power with the government policy makers. In order for the government to consider musculoskeletal medicine as an entity, we need to make back pain a national health issue.

Mental health was made a national health issue and GPs given special item numbers to deal with these health issues. These item numbers make it far more attractive to look after mental health patients than looking after patients with back pain. Apart from the lack of remuneration of musculoskeletal physicians, there are others within and outside the medical profession who compete with us in looking after musculoskeletal problems. Rheumatologists, occupational health physicians, rehabilitation physicians, and pain medicine physicians are of the opinion that we are competing for the same patients. As a result we do not have much of their support. Unless we can make some headway, musculoskeletal medicine in Australia will be a dying art. At the moment there is still no consensus on how we can form a united musculoskeletal college. We have had many discussions on this for several years, but have made no headway until now. I certainly hope that my successor, Geoff Harding, who is not only very experienced but also belongs to all three organizations of Australian musculoskeletal medicine, can lead in the formation of this united front.

We are not alone in being unable to attract new members. The Federation Internationale of Musculoskeletal Medicine (FIMM) is struggling financially and has split from the Academy, which is an organisation with individual members interested in the scientific education of musculoskeletal medicine (MM). FIMM remains the organization of national membership. Again despite FIMM having been in existence for a long time, the World Health Organization (WHO) has not recognized MM as medical work in diagnostics and therapy. MM still has a long way to go to be recognized globally. I quote the words of the FIMM president, Dr Heymann, that until now MM is recognized at the WHO level as the work of shamans and witchdoctors, of laypersons. Therefore, the question needs to be asked: Is there any point in continuing our membership with FIMM?

I propose that this needs to be discussed and debated at the AGM. We could not even use our FIMM membership status to add some weight to our negotiations with medical organisations or the government.

The 38th annual conference **Mastering Shoulders and Hips** to be held at the *Gold Coast* 17-19 July 2009 will be the highlight of our educational program this year. Our scientific committee has been working tirelessly to make this conference a very scientific and evidenced-based one as well as a practical one for those who attend. It will also be a great opportunity to catch up with old and new friends

in lovely surroundings at the Marriott Resort and Spa. The dinner will be the highlight of the social activities, with the usual excellent entertainment by our famous musicians. Don't miss out on this fabulous educational and social program. I look forward to seeing all of you there in July.

Following this year's conference, I encourage you all to cross the Tasman Sea to attend the **Spine in Action** conference in *Auckland* to be held 26-30 March 2010 to coincide with the Easter break. This promises to be a grand conference, with some high calibre keynote speakers already confirmed. I urge you all to mark these dates in your diary.

Postgraduate courses

ACPM-Macquarie University Advanced Medicine course in musculoskeletal medicine is commencing its first intake in 2010. It is hoped that this may eventually lead to increasing interest in musculoskeletal medicine.

The Otago course under the tutelage of our President-elect Geoff Harding is still running its course from Brisbane.

The Flinders course is taking its last intake under the leadership of Norm Broadhurst, as he is definitely retiring after next year. Norm has not indicated whether anyone will be taking over from him after he retires.

Local musculoskeletal meetings

Local meetings in Sydney, NSW, have been very few due to the lack of sponsorships from the pharmaceutical companies. Geoff Harding is still running meetings in rural Queensland and Brisbane. Well done, Geoff, and keep it up.

It has been an honour and a privilege for me to be your president for the last two years. I wish that I could have done more in this time, but unfortunately we are facing many challenges in forging ahead in musculoskeletal medicine. I would sincerely like to thank my V-P Geoff Harding for all his contributions and tireless efforts for the advancement of musculoskeletal medicine in general and AAMM in particular.

David Roselt as secretary and editor of the journal has done a tremendous job for many years and for this I could not thank him enough. He has sacrificed so much of his time and he will be sorely missed when he retires after the AGM.

Margi Taylor with the assistance of Martin Tucker has done a fantastic job in keeping our membership and finances up to date. I thank you both for a job well done.

I would also like to extend my sincere thanks to Vic Wilk as our webmaster and his constant contribution in various MSK matters.

Special thanks are also due to the conference committee, who have spent an enormous amount of time in organising the July conference. The committee's hard working members are Michael Yelland, Geoff Harding, Phillip Watson, Chris Homan, Thomas Choong, and yours truly. Of course we are ably assisted by Kate Ryall from DC Conferences.

Thanks to all the AAMM committee members who have helped in different ways and offered to serve on the committee over the last two years. I would encourage you all to continue your commitment with the incoming executive committee.

- *Michael Oei*

From the NZAMSM President

The year 2009 has started off fast enough for everyone and it is poignant to think we are already half way through the year. As always, there is so much to do and so little time to do it. The Executive has met regularly and continues to discuss a number of issues that affect the Association and musculoskeletal medicine in New Zealand. The exciting news is that the Department of Orthopaedics and Musculoskeletal Medicine at the Christchurch School of Medicine, University of Otago, has secured a Post-Graduate Masters in Pain Medicine and Management. The convener, Dr Jim Borowczyk, will be offering the program as of 2010. This is a unique and significant achievement that can only enhance the quality of pain management in New Zealand. The Christchurch Department of Orthopaedics and Musculoskeletal Medicine can now offer a range of post-graduate qualifications from a Certificate, Diploma, and now a Masters in our field of interest and expertise.

The Faculty is functioning well under the organizational skills of its secretary, Grant Thompson, and there is better delineation of Faculty issues from Association ones.

ACC have approached the Association to assist in several projects and various members will contribute to this process.

The Association hosted a successful Saturday in February with Brian Mulligan, a physiotherapist who has pioneered a number of unique manual techniques. About 15 members attended from the North Island and one from Nelson. Individual members provide local general practitioner and

GP trainee education. The Auckland group had its annual Roadshow presentation in early May

The Association has been liaising closely with FIMM and offering practical support and input as they strive to seek solutions for their members' futures. FIMM sees much merit in the Australasian model of specialist musculoskeletal medicine and how it has been successful in NZ. In Europe musculoskeletal and manual therapists are approaching the regulatory bodies to seek specialist recognition, including a submission to the WHO.

There will be no NZAMSM hosted annual scientific conference this year. AAMM has a conference in Queensland in July. As announced last year, what was to have been a FIMM conference hosted by NZAMSM will now be our sole responsibility in conjunction with support from AFMM, AAMM, and ACPM. Spine in Action has been resurrected and an exciting program of broad appeal is nearing completion. You may have received a flyer already. The theme is Spine in Action: Low Back Pain – Can chronicity be prevented? It is to be held at the Rendezvous Hotel in Auckland March 26-30, 2010. Invited speakers include Professors Lars Arendt-Nielsen, Johan Vlaeyen, Jacob Patijn, and Paul Watson. The neurobiology of pain, with particular reference to motor control and plasticity, psychological and psychosocial aspects of pain management, work place, return to work and vocational issues, plus evidence-based diagnostics will be some of the topics covered by the keynote speakers.

– Gary Collinson

NZAMSM Scientific Conference March 2010 in conjunction with AAMM, ACPM, & AFMM

Spine in Action: Low Back Pain - Can chronicity be prevented?

Rendezvous Hotel, Auckland City, Friday March 26 - Tues March 30

Confirmed Keynote Speakers

Prof. Lars Arendt-Nielsen

Center for Sensory-Motor Interaction

Department of Health Science and Technology, Aalborg University, Denmark

Prof. Paul J Watson

Professor of Pain Management and Rehabilitation,

Department of Health Sciences, University of Leicester, UK

Dr Jacob Patijn

Scientific Director FIMM Academy

Maastricht Netherlands

Prof. Johannes Vlaeyen

Professor of Psychology

Maastricht Netherlands

Registration details to be advertised later in the year

Letter to the editor

Dear sir,

We are pleased to announce the availability of limited places for the initial intake in February 2010 for a new Masters Degree Program in Musculoskeletal Medicine. This will be offered by Macquarie University in Sydney at its new postgraduate medical school, The Australian School of Advanced Medicine (ASAM).

ASAM is the first school of its kind to offer postgraduate sub-specialty/post-fellowship training in a private teaching hospital in Australia. A \$180 million health campus will soon be completed at Macquarie University in Sydney. It includes the Medical School and the 183-bed Macquarie University Private Hospital, which promises to be the most modern healthcare facility in Australia. The Medical School includes 1800 sq metres of purpose-built research laboratories, the Centre for the Advancement of Medical Education, dedicated Skills Centre and an Anatomy Laboratory. The campus is ahead of schedule, and first in-patient admissions to the hospital are expected in February 2010.

Research in the field of musculoskeletal medicine is also planned. Research is a high priority at ASAM. The school was recently designated a Concentration of Research Excellence (CoRE) at Macquarie, and is an International Luminary research site for GE Healthcare. The Masters courses, of which musculoskeletal medicine is one, are rigorously assessed and competency based.

The Master of Advanced Medicine in Musculoskeletal Medicine degree program is a two-year part-time course, taught in the Clinical School by the Department of Musculoskeletal

Medicine. It is expected to attract scholars from Australia and overseas. It is designed to train registered doctors with a strong interest in musculoskeletal medicine to assess and manage patients with musculoskeletal dysfunction and associated pain. Its emphasis will be on pattern recognition based on a sound knowledge of anatomy, biomechanics, postural and motor patterns, somatic referred pain, and physical examination.

This is a vocational rather than a purely "academic" course. Skills acquired in the program will include physical medicine techniques, with a strong emphasis on manual treatment by the doctor, injection treatments, specific exercise prescription and recognition of the roles of surgical, image guided and other treatments.

Successful completion of the Masters Degree will form the first part of the ongoing Fellowship program of the Australian College of Physical Medicine, as was the case for the previously available Masters Degree in Physical Medicine from Sydney University.

Thank you for this opportunity to share the news of this exciting development in our field of musculoskeletal medicine. Contact details will be posted in the Educational Activities section of this journal.

Yours sincerely

A/Prof Rod Ayscough
A/Prof Michael Creswick
Dept of Musculoskeletal Medicine
ASAM, Macquarie University NSW

Your MSK/Pain career

- Ever thought of a rewarding musculoskeletal specialist career with consultancy status?
- Are you pursuing, or interested in pursuing, a musculoskeletally-oriented medical career?
- Are you aware that a career in rehabilitation medicine can provide just that, and much more?
- Did you know that rehabilitation medicine in all of its facets (no pun intended, just gratis) already has recognition at consultant status with the Australasian Medical Advisory Committee?

I would be happy to discuss a MSK/Pain career based in Rehabilitation Medicine with any interested doctor any time.

Advertisements for all Registrar training positions will be appearing nationally in the July-September period, so don't forget to look for them and get your Application in!

*Dr Geoffrey Speldewinde
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Why I Pursue Discogenic Pain*

Professor Nikolai Bogduk, University of Newcastle, Department of Clinical Research, Royal Newcastle Hospital, Newcastle, Australia

The fundamental reason I pursue the diagnosis of discogenic pain is that patients have no other valid alternative. Patients with chronic back pain get caught in a circus (Figure 1). They are told that there is nothing wrong with them medically; or they are told something fallacious, such as they once did have nociception, but that has now ceased, and now they have only a "memory" of that pain. Under those conditions, medical treatment will not help, and the only prospect of treatment is behavioural and physical rehabilitation. But that treatment does not work. The patients still have pain. Yet again they are told there is nothing wrong. They failed rehabilitation, and the only recourse is to repeat it.

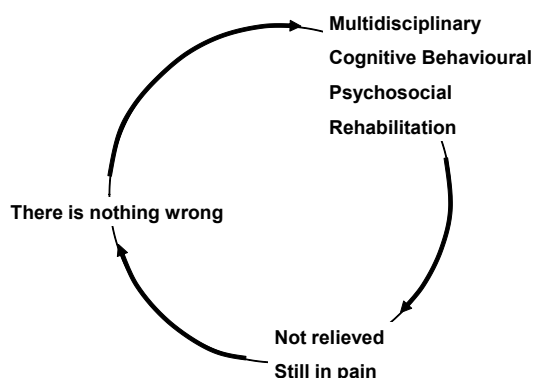


Figure 1. The back pain circus. Patients are told nothing is wrong, and they must undergo rehabilitation; but rehabilitation does not work. They still have pain, but are still told that nothing is wrong.

It is politically correct to declare that multidisciplinary pain treatment is not only effective, but is also superior to medical treatment. Yet examining the literature casts doubt on this.

Systematic reviews have found that behavioural therapy may be superior, in some respects, to no treatment but it is not more effective than exercises, and if added to physical rehabilitation it does not improve outcomes.¹ A review of multidisciplinary treatment programs, that is, functional restoration programs, found evidence that programs with less emphasis on physical domains are NOT effective; the evidence supported only those programs with an emphasis on intensive physical rehabilitation.² If one consults the source literature upon which the reputation of multidisciplinary therapy is based, a more sobering impression arises.

Deadorff et al³ treated 55 patients with physical therapy conditioning, work training, psychological pain management, and operant conditioning, and compared their outcomes with those of 15 patients who had no treatment. The treatment group achieved an average of 15 points reduction in pain

scores, from 64 to 49, at 10-13 months follow-up. But the group who had no treatment also achieved a similar reduction, from 71 to 54. Yet this is held to be a positive study. Moreover, excluded from the treatment group were Medicare and other patients who were considered not appropriate for therapy or who were not motivated. The control group was a convenience sample of patients who were denied payment for therapy by their insurance company.

The use of convenience samples is common in studies of multidisciplinary therapy. The Volvo Award-winning study of Mayer et al,⁴ which founded functional restoration, used a convenience sample as its control group. Thus, it appears acceptable to use convenience samples when the objective is to validate multidisciplinary therapy. This raises an intriguing comparison when, later, it comes to evaluating the literature on intradiscal therapy (see below).

A Swedish study compared patients treated with applied relaxation, or applied relaxation combined with operant conditioning, and patients put on a waiting list.⁵ In the three groups, pain scores dropped from 4.3 to 4.1, 6.0 to 4.7, and 5.6 to 5.4, respectively. Despite these clinically inconsequential changes and differences the study is considered positive.

A Norwegian study compared the outcomes of 142 patients treated with multimodal cognitive behavioural therapy with those of 81 patients who underwent usual care.⁶ In the treatment group, 50% returned to work. Meanwhile, 58% of the usual care group returned to work.

A study by a prominent US proponent of behavioural therapy compared the outcomes of patients put on a waiting list with those treated with behavioural therapy, exercises, or a combination behavioural therapy and exercises.⁷ The outcomes of behavioural therapy were not significantly better than those on no treatment (Figure 2).

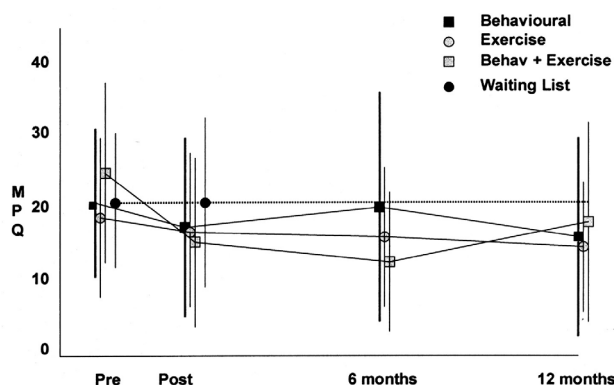


Figure 2. The outcomes of a study of behavioural therapy by Turner et al.⁷ MPQ: McGill Pain Questionnaire. The graph shows mean scores and standard deviations.

*Synopsis of the Case For, in a debate on discogenic pain conducted at the Annual Scientific Meeting of the German Pain Society, held in Bremen on 20 October, 2005; And reiterated at the Debate on Discography at the Annual Scientific Meeting of the Australian Association of Musculoskeletal Medicine, Melbourne, in November 2008.

Those patients who had exercise therapy were only slightly more improved than those who were put on a waiting list.

A German study found no difference in pain scores between patients treated with cognitive behavioural therapy and those put on a waiting list⁸ (Figure 3). Nor did this study find any differences in scores for depression (Figure 4).

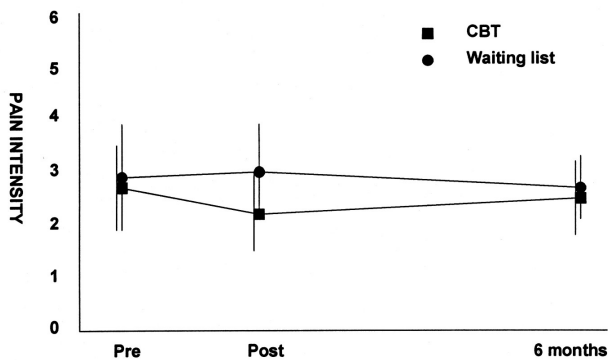


Figure 3. Pain scores in a study that compared cognitive behavioural therapy (CBT) and being put on a waiting list.⁸ The graph shows mean scores and standard deviations.

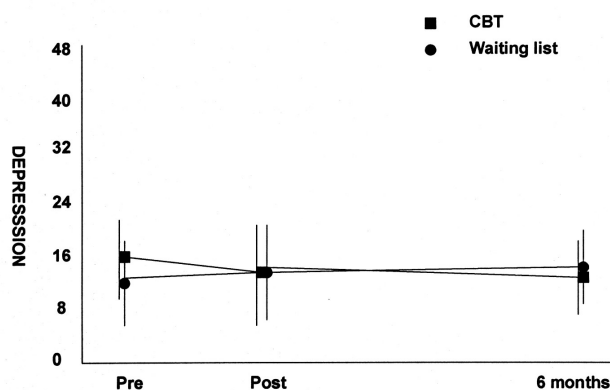


Figure 4. Scores for depression in a study that compared cognitive behavioural therapy (CBT) and being put on a waiting list.⁸ The graph shows mean scores and standard deviations.

This pattern was echoed in a seminal British study, in which cognitive behavioural therapy was compared with control intervention amounting to providing patients with attention.⁹ No differences were achieved with respect to pain (Figure 5) or depression (Figure 6). Moreover, this study was based on only nine patients.

Although a review of multidisciplinary functional restoration found that intensive programs do reduce pain and do improve function,² the source literature reveals the magnitude of these supposedly beneficial effects.

Functional disability improves from a score of 15.5 out of 30 to 8.5, and pain decreases from 5.3 to 2.7, at four months follow-up.¹⁰ Yet other studies from the same investigators attest to improvements in disability 16.9 to 12.1, and reductions in pain scores from 6.1 to only 5.7.¹¹

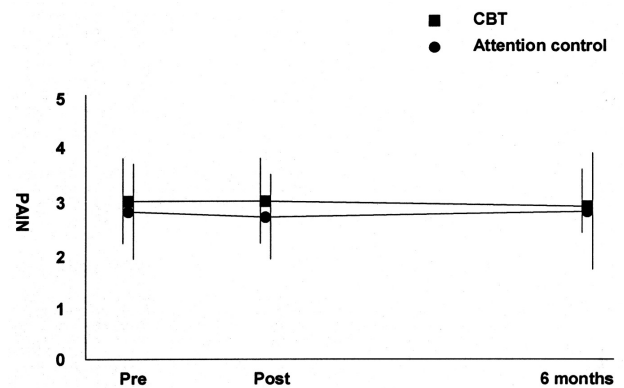


Figure 5. Pain scores in a study that compared cognitive behavioural therapy (CBT) with attention control.⁹ The graph shows mean scores and standard deviations.

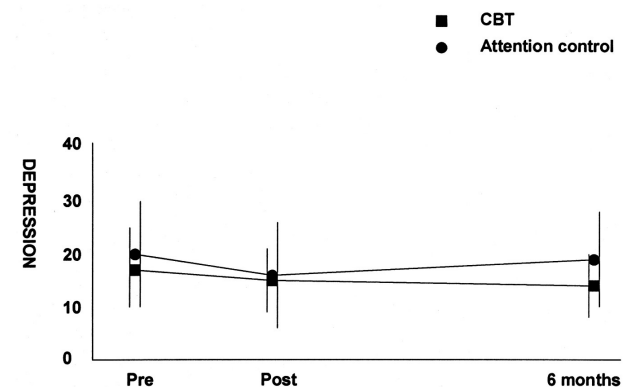


Figure 6. Scores for depression in a study that compared cognitive behavioural therapy (CBT) with attention control.⁹ The graph shows mean scores and standard deviations.

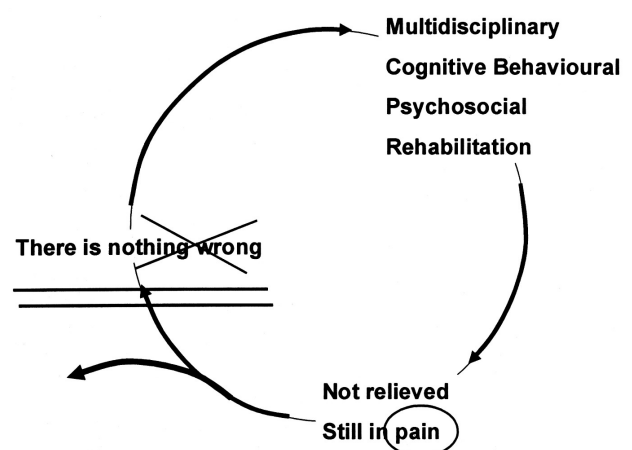


Figure 7. Breaking the back pain circus. Patients with persistent pain are withdrawn from the circus by investigating for its source, and by providing targeted therapy.

Studies such as these indicate that whatever else multidisciplinary and behavioural therapy programs might or might not achieve, they do not succeed in abolishing pain, or even substantially reducing it. Pain persists despite rehabilitation. It is that pain that I seek to diagnose and treat.

The objective is to break the circle (Figure 7). Persistent pain implies a source.

Finding a source of pain refutes the accusation that nothing is wrong. Finding a source provides for a legitimate and credible medical diagnosis. That alone can bring about closure: protecting the patient from continuing to pursue a diagnosis in a futile manner, and protecting them from arbitrary applications of treatment that does not match the source and cause of their pain, and which is doomed to failure.

As well, the prospect arises of providing a minimally invasive treatment directed accurately at the source of their pain.

Internal disc disruption

One of the conditions that I pursue is internal disc disruption. This condition is not disc degeneration. It is a specific condition characterized by degradation of the matrix of the nucleus pulposus and radial fissures that penetrate the annulus fibrosus, but without breaching the outer lamella (Figure 8). The perimeter of the disc is intact. The disruption is totally internal. The fissures may be entirely radial, or a radial fissure may extend circumferentially around the outer annulus. The extent of fissuring may be graded according to whether the radial fissure reaches the inner, middle, or outer third of the annulus,¹² or whether it extends circumferentially¹³ (Figure 9).

The morphological features of internal disc disruption cannot be demonstrated by plain radiography or by CT. Even MRI is of limited value (see below). The features can be shown only by post discography CT (Figure 10).

A large study, using multiple regression analysis showed that age changes and degenerative changes did not correlate with the disc being painful.¹⁴ Grade III fissures, however, correlated strongly with pain, and were not related to age changes (Table 1).

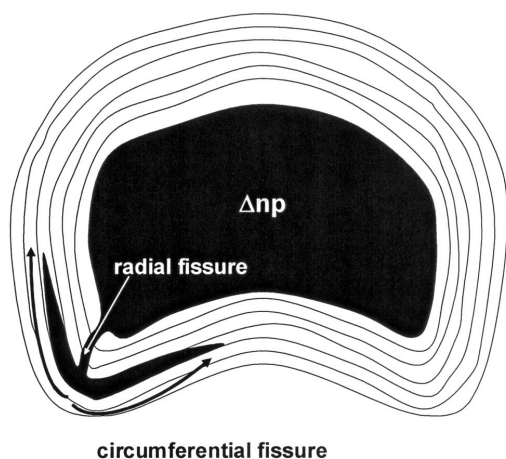


Figure 8. A sketch of a transverse section of a lumbar intervertebral disc, showing the characteristic features of internal disc disruption.

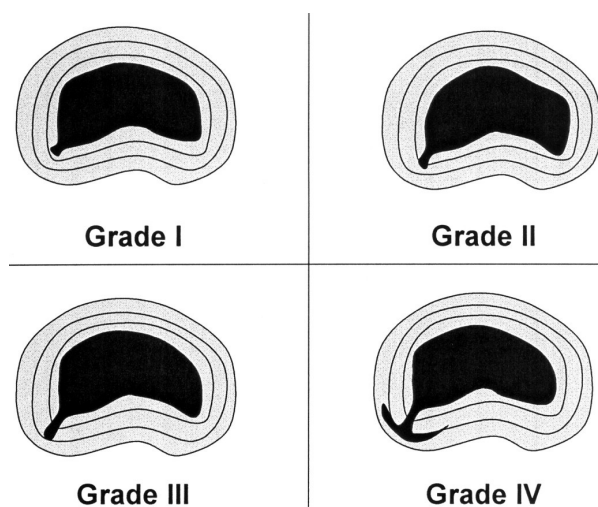


Figure 9. The grading of internal disc disruption according to the extent of fissuring of the annulus fibrosus.

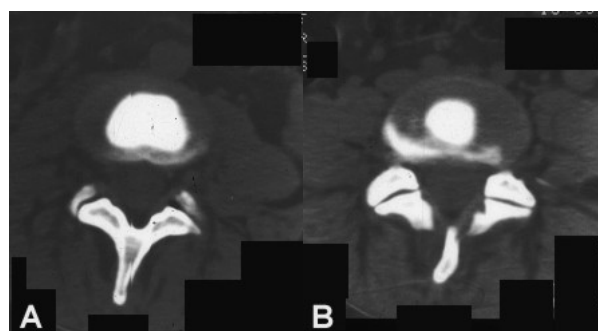


Figure 10. The appearance of discs on CT-discography. A: normal disc. The nucleus is rounded and contained within an intact annulus. B: Internal disc disruption. A radial fissure at 6 o'clock spreads circumferentially around the annulus.

Pain	Anular Disruption Grade			
	III	II	I	0
Reproduction				
Exact	43	29	6	4
Similar	32	36	21	8
Dissimilar	9	11	6	2
None	16	24	67	86

Table 1. The correlation between anular disruption and reproduction of pain from the affected disc. Based on Moneta et al.¹⁴

Internal disc disruption also exhibits biophysical features which cannot be faked. Stress profilometry is a technique whereby the internal stresses within a disc, across its diameter, can be measured. Normal discs exhibit a uniform distribution of stress across the anterior annulus, the nucleus pulposus, and the posterior annulus¹⁵ (Figure 11). In discs affected by internal disc disruption, two abnormalities are evident. Within the nucleus, the stresses are irregular and reduced, and may be zero in some discs, or in some regions of the nucleus (Figure 12). In the posterior annulus, the stresses are raised above normal (Figure 12).

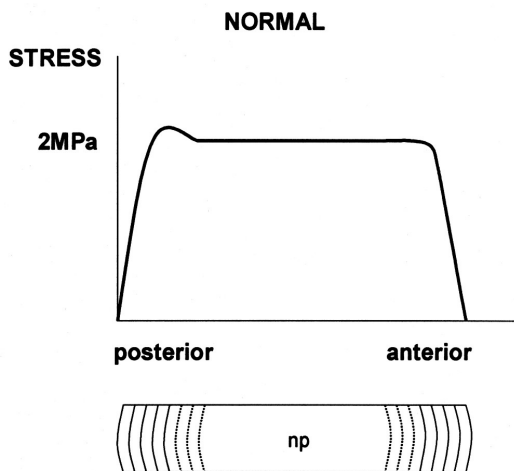


Figure 11. Stress profilometry of a normal disc. The stress is uniform across the anterior annulus, nucleus, and posterior annulus.

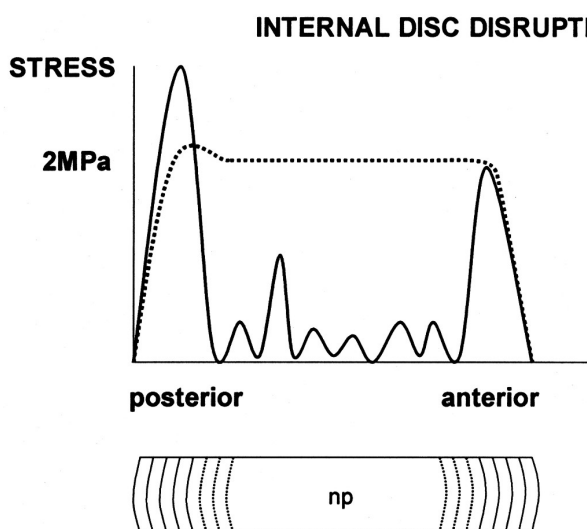


Figure 12. Stress profilometry of internal disc disruption. Nucleus stress is reduced and irregular. Posterior annulus stress is increased.

The depressurization of the nucleus reflects the degradation of the nuclear matrix, which can no longer retain water efficiently, in order to sustain axial loading. This results in extra load having to be borne by the posterior annulus.

Each of these biophysical features correlates with the disc being painful¹⁶ (Table 2). Discs with increased posterior annulus stress are likely to be painful; discs with normal annulus stress are uncommonly painful. Discs with a depressurized nucleus are highly likely to be painful; discs with normal nuclear pressure may or may not be painful. Painful discs are likely to exhibit increased annulus stress and a depressurized nucleus. Painless discs will have normal pressure in both the annulus and the nucleus.

	Pain	No Pain	Fisher's exact test
Anular Stress			
Stressed	17	2	p=0.001
Normal	1	11	
Nuclear Stress			
Depressurized	11	0	P=0.017
Normal	7	13	

Table 2. The correlation between pain and each of increased anular stress and decreased nuclear stress.

The etiology of internal disc disruption has been established. Biomechanics experiments have shown that the vertebral endplate is subject to fatigue failure.¹⁵ Subject to loads of 37-50% ultimate tensile strength, endplates can fracture after 2,000 or 1,000 repetitions. Subject to loads of 50-80% ultimate tensile strength, they can fail after as few as 100 cycles.^{17, 18} Such loads and repetitions are well within the ranges encountered during moderately heavy work activities.

When subjected to repeated compression loading, discs exhibit mechanical failure. If examined morphologically the failure coincides with the presence of an endplate fracture.

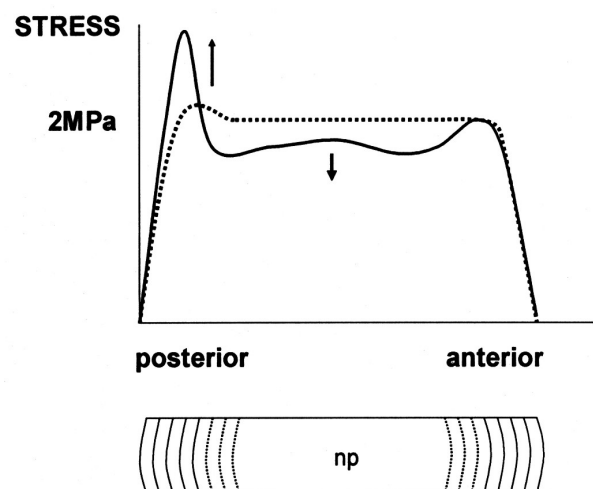


Figure 13. Stress profilometry of a disc immediately after the onset of a fatigue fracture of its vertebral endplate. The nucleus is depressurized and the posterior annulus stress increased markedly.

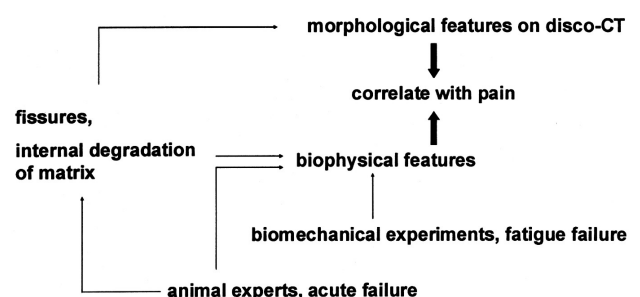


Figure 14. A synopsis of the correlates of internal disc disruption.

Furthermore, upon fracture of the endplate the disc exhibits the onset of the biophysical features of internal disc disruption: the nucleus is depressurized and posterior annulus stress abruptly increases (Figure 13).

The biochemical features of internal disc disruption have also been induced in live animal models.¹⁹ Experimental fracture of an endplate causes de-aggregation of proteoglycans in the nucleus, a reduction in water content, and depressurization of the nucleus, as well as delamination of the annulus.

Internal disc disruption is the most comprehensively understood cause of low back pain (Figure 14). The condition is characterized morphologically by a degraded nuclear matrix and radial fissures through the annulus. These morphological features correlate with the disc being painful. Affected discs exhibit specific biophysical features. These, too, correlate with the disc being painful. The mechanical etiology of internal disc disruption is fatigue failure of the endplate, which precipitates the biophysical features of the condition. The biochemical features have been produced by endplate fractures in animal models.

Clinical studies have determined that internal disc disruption is the basis for pain in as many as 40% of patients with chronic low back pain.²⁰ This estimate of prevalence is a worst-case estimate. It excluded two-level disease. The prevalence of internal disc disruption may be considerably higher than 40%; but 40% itself amounts to a considerable proportion of patients in whom a patho-anatomic diagnosis can be established.

Diagnosis

The diagnostic criteria for internal disc disruption²¹ are:

- reproduction of the patient's pain by stimulation of the affected disc (Figures 15 and 16),
- such that the evoked pain has an intensity of at least 7 on a 10-point scale, and
- pain is reproduced at a low pressure of stimulation: 15 psi (1 kg cm⁻²),
- provided that of adjacent discs does not reproduce pain, and
- post-discography CT demonstrates a grade III or IV fissure (Figure 17).

The guidelines of the International Spine Intervention Society²¹ provide instruments to assist practitioners in the conduct of lumbar disc stimulation. One indicates the information that should be obtained at the time of disc stimulation (Appendix 1). The other provides a scoring system by which to determine whether a patient's response is positive or not (Appendix 2). I use these both to establish a record of the procedure and its interpretation, and to ensure that my interpretations remain consistent and, therefore, reliable.

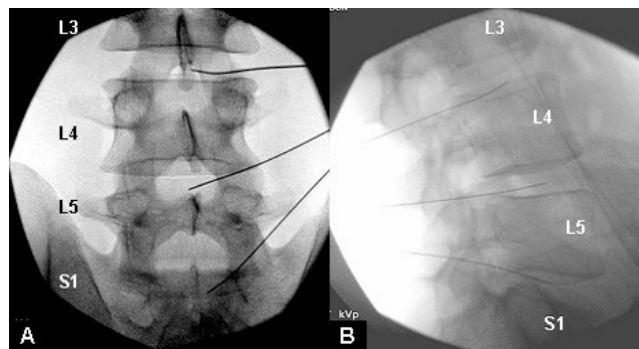


Figure 15. Placement of needles into the three lower lumbar discs, prior to disc stimulation. Reproduced from the ISIS guidelines.²¹

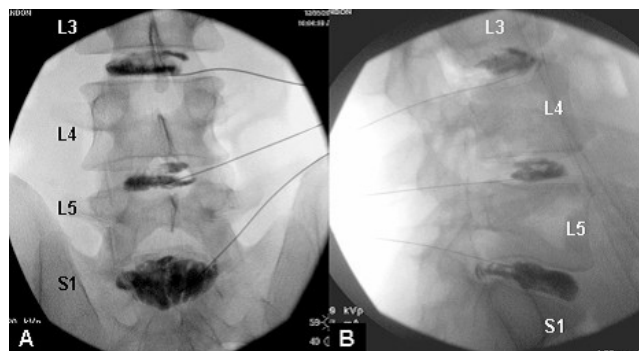


Figure 16. The appearance of the three lower lumbar discs, after injection of contrast medium into the nucleus. Reproduced from the ISIS guidelines.²¹

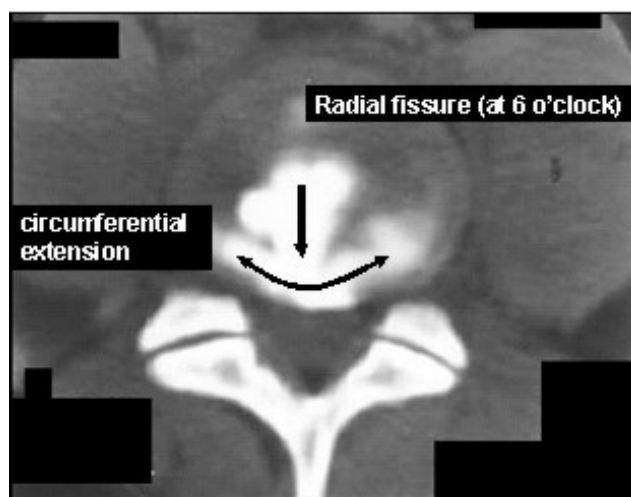


Figure 17. The diagnostic features of internal disc disruption on CT-discography.

Controversy

Some investigators have warned that disc stimulation may produce false-positive responses. They based this warning on the responses to disc stimulation of sets of patients who

had no symptoms, who had chronic pain but not back pain, and who had been diagnosed as having a somatization disorder.^{22, 23} Explicitly they imputed false-positive rates of 10%, 20%, and 75% in these groups, respectively. However, those percentages were based on sample sizes of only 10, 10, and 4 patients, respectively (Table 3). These small sample sizes result in wide confidence intervals of the estimated rates, which render them poorly representative. Other considerations modify the estimates as well.

Category of Subject	Imputed False-Positive Rate	95% confidence intervals
Asymptomatic	1/10 = 10%	0% - 29%
Chronic pain	4/10 = 40%	10% - 70%
Somatization	3/4 = 75%	33% - 100%

Table 3. The imputed false-positive rate of disc stimulation in three categories of subjects, based on Carragee et al.²²

The cited estimates did not adhere to the recommended criteria for disc stimulation. They were not subject to anatomic controls, which require that adjacent levels be not painful. They were not subject to manometric criteria.

If the original data are analysed, and if the criteria for anatomic controls are applied, the imputed false-positive rate in asymptomatic subjects remains 10%, but that for patients with chronic pain reduces to 20%. The rate for subjects with somatization remains 75% (Table 4). The confidence intervals remain wide.

Category of Subject	Imputed False-Positive Rate	95% confidence intervals
Asymptomatic	1/10 = 10%	0% - 29%
Chronic pain	2/10 = 20%	0% - 45%
Somatization	3/4 = 75%	33% - 100%

Table 4. The imputed false-positive rate of disc stimulation in three categories of subjects, if the criteria for anatomic controls is applied.

Manometric criteria are essential for disc stimulation, for it is a provocation test. In principle, any disc, even a totally normal one, might be painful if it is stressed strongly enough. The pressure limits beyond which the disc should not be stimulated can be derived from data on normal volunteers. Such data exist.²⁴

If asymptomatic volunteers, or volunteers who have experienced back pain only occasionally, undergo disc stimulation, a pattern of responses emerges. In some subjects, some discs are not painful even if the disc is stressed to 100 psi (6 kg cm⁻²). Otherwise, however, there is a two-fold trend. The chance that a disc is painful increases as the pressure of stimulation is increased, but if the disc is painful the intensity of pain tends to be low; the pain is unlikely to be severe (Table 5).

Across such data a boundary can be identified: at pres-

ures below which pain does not occur in normal volunteers, or at which the intensity of pain does not exceed certain prescribed values (Table 5). For example, the chances are effectively zero that a normal volunteer will perceive pain if their discs are stimulated up to a pressure of 20 psi. Alternatively, the chances are zero that they will perceive pain of intensity 6/10 or greater if their discs are stimulated up to a pressure of 70 psi.

These data vindicate previously invoked, ad hoc, operational criteria.²⁵ At pressure of injection up to 50 psi, normal subjects should be very unlikely to experience pain whose intensity exceeds 6/10. Up to 15 psi, no normal subject should experience any pain. Applying these manometric criteria reduces the imputed false-positive rate of disc stimulation.

If the criterion of 50 psi is applied, the false positive rates in asymptomatic subjects and in subjects with chronic pain fall to 10% (Table 6), which are clinically tolerable levels. If the criterion of 15 psi is applied, the false-positive rates become zero in asymptomatic subjects and in subjects with chronic pain. In patients with somatization they fall to 25% (Table 7).

	VAS	0 1 2 3 4 5 6						
		0.30	0.40	0.25	0.25	0.25	0.10	0.00
100	Occ	0.17	0.48	0.30	0.22	0.09	0.04	0.04
	No	0.35	0.40	0.25	0.25	0.25	0.10	0.00
90	Occ	0.22	0.43	0.30	0.22	0.09	0.04	0.04
	No	0.55	0.30	0.25	0.25	0.25	0.10	0.00
80	Occ	0.22	0.43	0.30	0.22	0.09	0.04	0.04
	No	0.55	0.30	0.25	0.25	0.25	0.10	0.00
70	Occ	0.52	0.30	0.17	0.13	0.04	0.00	0.00
	No	0.65	0.30	0.25	0.25	0.25	0.10	0.00
60	Occ	0.65	0.30	0.17	0.12	0.04	0.00	0.00
	No	0.75	0.20	0.15	0.15	0.15	0.05	0.00
50	Occ	0.83	0.17	0.09	0.06	0.04	0.00	0.00
	No	0.80	0.15	0.10	0.10	0.10	0.00	0.00
40	Occ	0.96	0.04	0.00	0.00	0.00	0.00	0.00
	No	0.95	0.05	0.00	0.00	0.00	0.00	0.00
30	Occ	1.00	0.00	0.00	0.00	0.00	0.00	0.00
	No	1.00	0.00	0.00	0.00	0.00	0.00	0.00
20	Occ	1.00	0.00	0.00	0.00	0.00	0.00	0.00
	No	1.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5. The responses to disc stimulation of subjects with no history of back pain (No) and subjects with a history of occasional back pain only (Occ), according to the pressure of stimulation and the intensity of pain evoked. The tabulated figures are the cumulative frequency of responses, which reflect the chances of pain of a particular intensity occurring at a particular pressure of injection. The line indicates the boundary below which normal volunteers do not experience pain. From Derby et al.²⁴

Category of Subject	Imputed False-Positive Rate	95% confidence intervals
Asymptomatic	1/10 = 10%	0% - 29%
Chronic pain	1/10 = 10%	0% - 29%
Somatization	2/4 = 50%	1% - 99%

Table 6. The imputed false-positive rate of disc stimulation in three categories of subjects, if the criterion for anatomic controls is applied together with the manometric criterion of 50 psi.

Category of Subject	Imputed False-Positive Rate	95% confidence intervals
Asymptomatic	0/10 = 0%	0% - 28%
Chronic pain	0/10 = 0%	0% - 28%
Somatization	1/4 = 25%	0% - 69%

Table 7. The imputed false-positive rate of disc stimulation in three categories of subjects, if the criterion for anatomic controls is applied together with the manometric criterion of 15 psi.

These considerations indicate that the threat of false-positive responses to disc stimulation have been exaggerated. In asymptomatic individuals and in patients with chronic pain, the imputed false-positive rate is effectively zero, provided that the stringent operational criteria for disc stimulation are satisfied. Only in patients with somatization might concern about false-positive responses be justified. The false-positive rate in such patients is not clearly evident, because of the small sample size that has been studied; but it does appear to be non-zero.

Imaging

Certain features evident on MRI increase the likelihood that the affected disc has internal disc disruption and is painful. They are Modic lesions and high-intensity zones.²⁷⁻³²

Modic type I lesions occur in the spongiosa of the vertebral bodies adjacent to the affected disc. They appear as a high-intensity signal on T2-weighted images. They indicated edema of the spongiosa. Modic type II lesions appear as a high intensity signal in the spongiosa on T1-weighted images. They reflect fatty infiltration of the vertebrae. These lesions have a strong correlation with the disc being painful on stimulation (Table 8). The low sensitivity reflects the fact that not all patients with discogenic pain exhibit these features. The high specificity, however, indicates that when Modic changes are present they are nearly always associated with a painful disc.²⁶

Sensitivity	Specificity	Likelihood Ratio	Reference
0.23	0.97	7.7	26
0.22	0.95	4.4	27

Table 8. The strength of relationships between Modic changes and discogenic pain.

High intensity zones (HIZ) are a very bright signal contained within the posterior annulus fibrosus, as seen in sagittal sections on MRI. They are sagittal sections of circumferential fissures (Figure 18). Not all fissures or grey spots on an MRI constitute an HIZ, however (Figure 19). To constitute an HIZ, the zone must have a very bright signal on heavily T2-weighted scans; the brightness should rival or exceed

that of the cerebrospinal fluid.

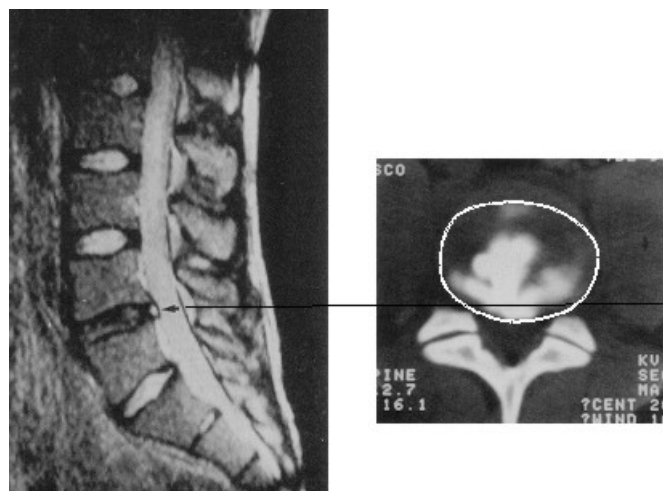


Figure 18. The anatomy of high intensity zones (HIZs). The HIZ seen on sagittal MRI of an L4 disc (arrowhead) constitutes a sagittal section of the transversely widest length of a circumferential fissure, as shown in the CT discogram.

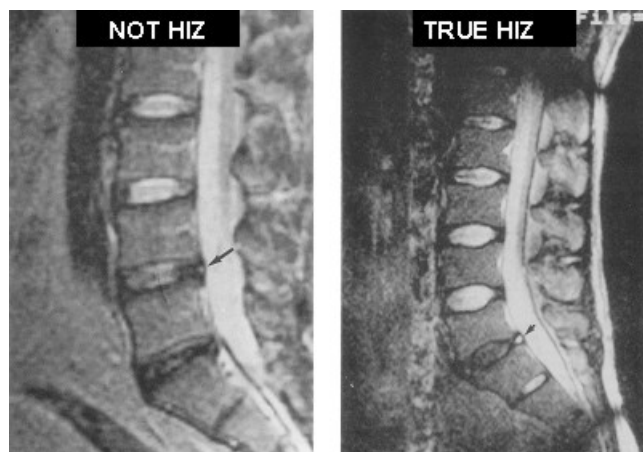


Figure 19. Not all spots in an annulus fibrosus constitute an HIZ. Grey spots may represent a fissure in the annulus, but they are not high intensity signals. In an HIZ the signal intensity exceeds that of the CSF.

The original study of HIZs found that their presence in patients with low back pain correlated strongly with the affected disc being painful on disc stimulation.¹³ In this regard it is important to appreciate what was demonstrated. The study did not state that HIZs distinguished subjects with pain from those without pain. Explicitly it found that if present in patients with back pain the HIZ strongly implicated that disc as the source of the patient's pain. The correlation was not absolute, but was nonetheless very strong. An HIZ does not prove that the disc is definitely the source of pain, but it increases the odds that the disc is the source of pain by a factor of 6.5.

Several studies have reinvestigated this association.²⁷⁻³² Although the specific statistical variables differ, the same pattern recurs (Table 9).

Sensitivity	Specificity	Likelihood Ratio	Reference
0.71	0.89	6.5	13
0.52	0.90	5.2	27
0.27	0.95	5.4	28
0.78	0.74	3.0	29
0.31	0.90	3.1	30
0.09	0.93	1.3	31

Table 9. The strength of relationships between a high intensity zone and discogenic pain.

HIZs do not occur in all patients. This is reflected by the low sensitivity of the sign as a predictor of pain. However, all studies, including the one detracting study,³¹ consistently show high specificity. That feature indicates a double negative: that if present, it is very uncommon for an HIZ to occur in a disc that is not painful. This results in a high positive likelihood ratio: that the presence of an HIZ strongly implies that the affected disc is the source of pain. A likelihood ratio of 5 increases the likelihood that internal disc disruption is the cause of pain from a pre-test probability of 0.4 to a post-test probability of 0.77. Even a likelihood ratio of 3 provides a post-test probability of 0.67.

Some investigators³² have ventured to discredit the HIZ. They claimed that the sign was not diagnostic because HIZs occur in subjects without back pain. However, their data nevertheless indicate that HIZs significantly correlate with pain (Table 10). HIZs occur nearly three times more frequently in patients with pain than in subjects with no pain. The 95% confidence intervals of the respective proportions do not overlap (Table 10). If the subject was less controversial and emotional such a statistical difference would be considered incontrovertible.

Furthermore, the criticism of HIZ is misdirected. The HIZ was never advocated as a sign of pain. It is a sign in patients with back pain that the affected disc is the source of pain. In this regard, even the disparaging study³² provides data to this effect. The sign has a high specificity and reasonable likelihood ratio (Table 11).

	Asymptomatic	Symptomatic
HIZ Present	13	25
HIZ Absent	41	17
Prevalence	0.24	0.60
95% CI	0.13 - 0.35	0.45 - 0.75

Table 10. The prevalence of high intensity zones (HIZ) in samples of asymptomatic and symptomatic subjects, based on Carragee et al.³²

Notwithstanding these arguments concerning MRI, detecting an HIZ does not provide for a final diagnosis. Its presence renders it more likely than not that the affected disc is the source of pain. For conservative purposes, this level of confidence may be enough. However, if target-specific

therapy is to be undertaken, the putative diagnosis needs to be confirmed by disc stimulation.

HIZ	Disc	
	Painful	Not Painful
Present	24	9
Absent	29	47
Sensitivity: 0.45 Specificity: 0.84 Likelihood Ratio: 2.8		

Table 11. The strength of relationships between high intensity zone lesions and disc pain, in the study of Carragee et al.³²

Treatment

There is no evidence that any form of conservative therapy is effective for proven internal disc disruption. No study of exercise, physical therapy, drugs, or other non-invasive intervention has been performed in patients in whom a diagnosis of internal disc disruption has been established. Nor have any controlled studies been reported of surgery for internal disc disruption.

The only intervention that has been studied is minimally invasive intradiscal therapy in the form of intradiscal electrothermal therapy (IDET). The procedure involves threading a flexible electrode into the painful disc, and using it to heat and coagulate the posterior annulus in the region affected by radial and circumferential fissures³³ (Figure 20). The outcomes of this treatment are limited but nevertheless encouraging.

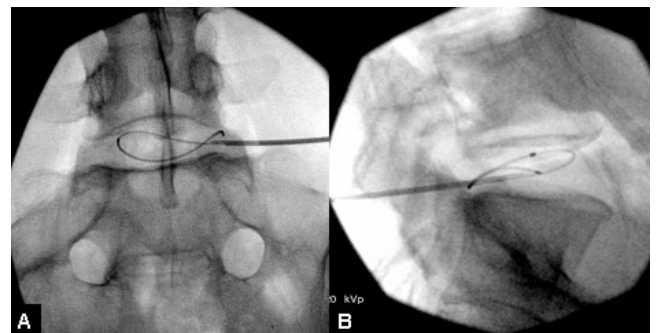


Figure 20. An electrode introduced into an L5-S1 intervertebral disc for the conduct of intradiscal electrothermal therapy. Reproduced from the ISIS guidelines for electrothermal therapy.³³

One study compared IDET with rehabilitation.³⁴ Both groups of patients commenced with similar pain scores. After treatment and at follow-up 12 months and two years after treatment those scores were significantly better in those patients treated with IDET (Table 12).

VAS for Pain	Rehab	IDET	P value
Inception	8 (5-8)	8 (7-9)	0.07
3 Months	8 (7-8)	3.5 (1-5)	0.00
6 Months		3 (1-6)	
12 Months	7.5 (5-8)	3 (1-7)	0.01
24 Months	7.5 (4-8)	3 (1-7)	0.03

Table 12. Median pain scores and interquartile ranges from a study that compared the rehabilitation and intradiscal electrothermal therapy (IDET) for internal disc disruption.³⁴

Cumulative proportions showed that more patients treated with IDET achieved large reductions in pain, such that the number needed to treat for an outcome of complete reduction in pain was 5; for 50% reduction the number needed to treat was 3 (Table 13). When composite criteria were applied, 54% of patients treated with IDET achieved at least 50% reduction of pain with return to work and no need for opioids, compared to only 10% of patients treated with rehabilitation (Table 14).

Δ VAS	Number		Cumulative Proportion		
	IDET	Rehab	IDET	Rehab	NNT
100	7		0.20	0.00	5
90	0		0.20	0.00	5
80	3		0.29	0.00	5
70	3	1	0.37	0.11	4
60	2	0	0.49	0.11	4
50	5	1	0.57	0.22	3
40	0	0	0.57	0.22	
30	4	0	0.69	0.22	
20	2	3	0.74	0.56	
10	2	1	0.80	0.67	
0	7	1	1.00	0.78	
Worse	0	2		1.00	

Table 13. The number of subjects and the cumulative proportion of subjects who achieved selected percentage improvements in pain scores (ΔVAS) after two-year follow-up in a study that compared rehabilitation and intradiscal electrothermal therapy (IDET) for internal disc disruption.³⁴

This study has been criticized because it was not randomized, and instead used a convenience sample of patients whose insurers denied treatment. It is ironic, if not hypocritical, that this same criticism is not levelled at studies of multidisciplinary therapy which used the very same procedure.

OUTCOME	TREATMENT GROUP	
	IDET	Rehab
50% reduction of pain + RTW + no opioids	0.54	0.10
100% reduction of pain + RTW + no opioids	0.20	0.00

Table 14. The proportion of subjects who achieved the composite outcomes indicated, at two-year follow-up, in a study that compared rehabilitation and intradiscal electrothermal therapy (IDET) for internal disc disruption.³⁴ RTW: return to work.

A placebo-controlled study³⁵ warned that placebo-responses could occur in patients undergoing intradiscal therapy. However, IDET was significantly more effective than placebo for the reduction of pain (Table 15) and for the improved of physical function in disabled patients.

Both of these studies, however, show that IDET is an incomplete treatment. Some 50% of patients do not benefit at all. Other, observational studies show variable success rates (see Bogduk et al.³⁶ for review).

OUTCOME	TREATMENT GROUP			
	IDET		SHAM	
	n		n	
ΔPain (0-100) worse same better <20 better >20	2	6%	8	33%
	5	16%	5	21%
	7	22%	2	8%
	18	56%	9	38%
P = 0.037				
ΔPain (%) <0 0-24 25-49 50-74 75-99 100	2	6%	8	33%
	11	34%	6	23%
	6	22%	2	8%
	5	16%	7	29%
	5	13%	9	0%
	3	9%	1	4%
P = 0.027				

Table 15. The number and proportion of patients who achieved selected absolute and percentage changes in pain scores, at six months follow-up, in a study that compared intradiscal electrothermal therapy (IDET) with sham therapy for internal disc disruption.³⁵

Among the reasons for variable success rates are differences in patient selection and technique used.^{36, 37} When originally described, the procedure required placement of the electrode at the interface between the nucleus and inner annulus (Figure 21).

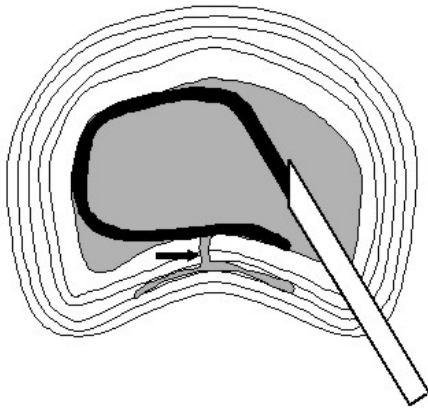


Figure 21. The recommended placement of an electrode for intradiscal electrothermal therapy, as originally described.³⁸

Those studies with better outcomes placed the electrode in the outer annulus. The optimum position requires crossing the radial fissure and lying parallel but peripheral to any circumferential fissure (Figure 22). If such a peripheral placement cannot be achieved, a more central placement, inside the circumferential fissure but nevertheless parallel and as close as possible to it, is preferred (Figure 23). If the radial fissure cannot be crossed using a single insertion of the electrode, the fissures are addressed by bilateral placements (Figure 24).

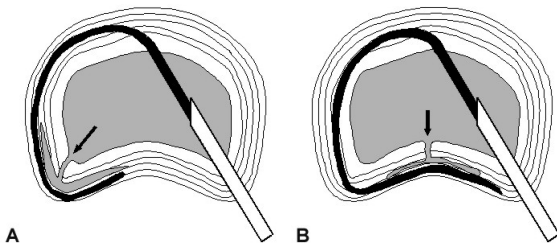


Figure 22. Suggested optimal placement of electrodes for intradiscal electrothermal therapy. The electrode crosses the radius of a radial fissure and lies parallel but peripheral to the circumferential fissure. A: for a radial fissure at between 7 o'clock and 8 o'clock. B: for a radial fissure at 6 o'clock.

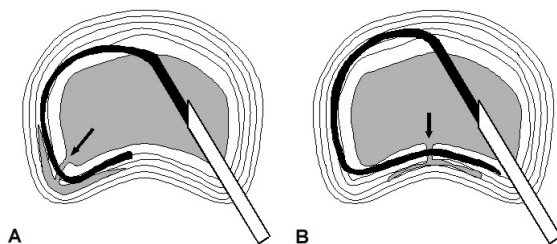


Figure 23. Alternative placement of electrodes for intradiscal electrothermal therapy. If the electrode cannot be placed peripheral to the circumferential fissure, it should be placed across the radial fissure and parallel to the circumferential fissure but internal to it. A: for a radial fissure at between 7 o'clock and 8 o'clock. B: for a radial fissure at 6 o'clock.

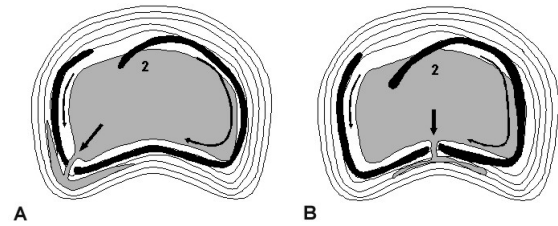


Figure 24. If the radial fissure cannot be crossed using a single insertion, bilateral placements are required to address the entire length of a circumferential fissure. A: for a radial fissure at between 7 o'clock and 8 o'clock. B: for a radial fissure at 6 o'clock.

These various considerations, however, address only two of the three dimensions of possible technical limitations for IDET. They address how far out and how far across the electrode is placed. They do not address how high or low the electrode is placed in the disc. The latter has been raised as a basis for incomplete effects of treatment.³⁶

The IDET electrode has only a small field of influence. It coagulates tissues in a region within about one electrode width of the electrode. For some fissures, this field of influence might be enough, that is, the electrode crosses the fissure and completely coagulates it. In other cases this might not occur. The electrode might pass only partially through a fissure, or may pass entirely below or above the fissure (Figure 25A). In those instances coagulation, and hence the therapeutic effect, will be incomplete or nil.

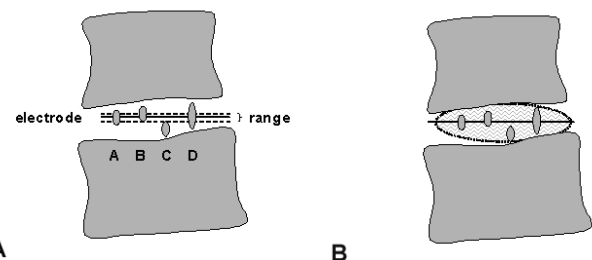


Figure 25. Considerations of the height of placement of the electrode in intradiscal electrothermal therapy. A: The dotted lines indicate the effective range of an electrode. If the electrode passes through a fissure it will coagulate the fissure, but the electrode may pass through only part of a fissure, or pass entirely below or above a fissure. In which case the electrode will fail to coagulate the fissure completely. B: What is required is an electrode whose lesion encompasses the range of possible heights of fissures.

For this limitation to be overcome an electrode is required that produces a lesion that encompasses all the possible heights of fissures (Figure 25B). To this end, an emerging technology is cold radiofrequency. This technology uses bipolar electrodes. If electrodes are inserted into each posterior corner of the target disc, a lesion is made that spans between them across the entire height of the disc (Figure 26). This technology is currently being evaluated.

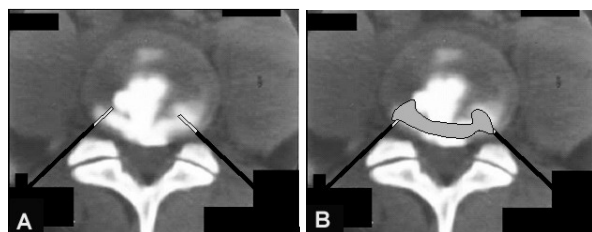


Figure 26. CT scans illustrating the principles of cold RF. A: bipolar electrodes are placed into the posterior corners of the disc, bracketing the target fissure. B: the lesion produce arches between the electrodes and fully encompasses the target fissure.

Where I and the colleagues in my Department differ from most other practitioners is the context in which we provide intradiscal therapy. We do so only with the approval of an ethics committee. The terms of approval allow us to evaluate the efficacy of such interventions and the efficacy of adaptations, such as multiple placements of electrodes, designed to improve efficacy. In consideration of this approval, we undertake to monitor and report our outcomes. Under these conditions we invite patients to participate in studies of emerging technology. In this way we offer them the possible benefit of these procedures but without pretending that they will work.

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Appendix 1. Assessment Sheet for Disc Stimulation

Patient's name: ID number:.....

Date of Procedure: Name of Operator:.....

Pre-procedural VAS:

SEGMENT STUDIED

RESPONSE (Circle appropriate entries)

L..... Not Done Reason: Unnecessary Fusion Inaccessible
 PAIN None Dissimilar Concordant VAS:.....
 PRESSURE Opening:..... Pain:..... Final:.....
 Remarks:

L..... Not Done Reason: Unnecessary Fusion Inaccessible
 PAIN None Dissimilar Concordant VAS:.....
 PRESSURE Opening:..... Pain:..... Final:.....
 Remarks:

L..... Not Done Reason: Unnecessary Fusion Inaccessible
 PAIN None Dissimilar Concordant VAS:.....
 PRESSURE Opening:..... Pain:..... Final:.....
 Remarks:

L..... Not Done Reason: Unnecessary Fusion Inaccessible
 PAIN None Dissimilar Concordant VAS:.....
 PRESSURE Opening:..... Pain:..... Final:.....
 Remarks:

DIAGNOSTIC CONCLUSION:

Negative Indeterminate Positive Positive Levels.....

Signed: Date:

Appendix 2: Scoring system for response to disc stimulation

VARIABLE		SEGMENTS STUDIED				Sum of Rows
		L2-3	L3-4	L4-5	L5-S1	
CONCORDANT LEVELS	points					
Concordant Pain	30					
Pain > 5/10	5					
Pain > 7/10	5					
Pressure < 50psi	10					
Pressure < 15 psi	10					
SUBTOTAL						
Divide subtotal by number of concordant discs. Enter result in this row.						
CONTROL LEVELS	points	L2-3	L3-4	L4-5	L5-S1	
No Pain	30					
Pain at < 50psi	- 10					
Pain at < 15 psi	- 10					
TOTAL of Sums of Rows below the double line						
Interpretation: > 70 points = POSITIVE 40-60 points = INDETERMINATE < 40 points = NEGATIVE						

1. For each disc studied (see columns), enter the appropriate score for each of the variables indicated (rows).

For discs with CONCORDANT PAIN,

Enter 30 if the concordant pain is produced.

Enter 5 if the pain produced is greater than 5/10.

Enter another 5 if the pain produced is also greater than 7/10.

Enter 10 if the pressure at which pain occurred is anything less than 50 psi.

Enter another 10 if the pressure is also less than 15 psi.

For discs at CONTROL LEVELS, i.e. not concordant pain,

Enter +30 if the disc was painless.

Enter -10 if pain occurred at a pressure less than 50 psi.

Enter another -10 if pain occurred at a pressure also less than 15 psi.

2. For the CONCORDANT DISCS, add up the scores in each row, and record the sum of each row in the column labeled Sum of Rows.

3. Add up the sums of the rows for all concordant discs, i.e. all scores above the double line. Divide this total by the number of concordant discs, and record the quotient in the cell indicated, immediately below the double line, in the column labeled Sum of Rows.

4. For the NON-CONCORDANT DISCS, add up the scores in the rows, taking heed of any negative numbers, and record the sum of each row in the column labeled Sum of Rows.

5. Add up the total of the Sums column below the double line, taking care to heed negative numbers.

6. Interpret the result.

Coccygeal Pain

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This paper is based on searches of PubMed for “coccygeal pain,” “coccydynia,” “coccygectomy” and “coccygodynia” and “coccyx”.

Introduction

Coccygeal pain (also known as coccydynia and coccygodynia) refers to pain derived from the coccyx. The term defines a symptom rather than a diagnosis.¹

Coccydynia was first described by Petit in 1726, as “caries of the coccyx.”² Understanding of its etiology has varied significantly during its history. At the beginning of the twentieth century, coccydynia was thought to derive from trauma, and coccygectomy was a common procedure.² During the early twentieth century coccydynia was understood to be the result of neurosis and hysteria.² Coccydynia is now understood to result from a number of specific conditions, but the etiology of many cases remains unknown.

The coccyx consists of 1-4 bony segments (the first and second of which may be mobile) joined to the distal sacrum by the fibrous joint of the sacro-coccygeal junction.² This joint is bound by the sacrococcygeal ligaments, which, in conjunction with the sacral cornu, form the last intervertebral foramen, through which the fifth sacral nerve root exits.² The region is richly innervated: the S5 root combines with the anterior division of L5 and fibers from L4 to form the coccygeal plexus, which is anterior to the sacrum and coccyx, and posterior to the pelvic organs.² Autonomic innervations consist of the ganglion impar, and the inferior and superior hypogastric plexuses.²

Pathophysiology

Pain in the region of the coccyx may be derived from the coccyx itself, or referred to this region from an anatomically distant structure. Pain may also be associated with pathology of the musculo-ligamentous attachments of the coccyx.

Pain from the coccyx

Severe acute pain is often associated with trauma,³ in which there may be bruising of the coccygeal periosteum. Deposition of calcium crystals in the intercoccygeal and sacrococcygeal joints has also been identified recently as a rare cause of acute coccydynia.³

Chronic coccydynia may result from disc degeneration, instability of the sacrococcygeal joint, deformity of the coccyx, or disruption of the sacrococcygeal joint.³

Other coccygeal causes of coccydynia include infection, tumor and stiffness or degenerative change of the sacrococcygeal junction.^{4, 3} It has also been suggested that coccydynia with well-localized tenderness may be an

inflammatory condition.⁴

Referred and neuropathic pain

Somatic and visceral pain may both be referred to the coccyx. Sources of somatic pain include the sacroiliac joint and lumbar spine. If pain is referred from the sacroiliac joint(s), pain over these structures would also be expected.⁵ If pain is referred from the lumbar spine, low back pain is expected to be more prominent than coccygeal pain. Visceral referred pain may originate from the rectum and from other intra-pelvic structures. Neuropathic pain such as pudendal neuralgia may also be present.

While many causes of coccydynia have been identified, a large number of cases are idiopathic. Very little is understood about the etiology of these cases.²

Clinical presentation

Coccydynia is characterized by focal, axial coccygeal pain. If pain is somatic it is typically exacerbated by pressure, such as prolonged sitting, and relieved by lying down.⁴

On physical examination, local tenderness to palpation is observed if the source of pain is local. Local tenderness does not, however, exclude the possibility that pain is referred from distant sites. Neuropathic pain is less localized and experienced as a burning or lancinating pain that is sometimes associated with paresthesia or dysesthesia.⁴

The natural history of coccygeal pain is unknown. As with most pain syndromes, however, the longer pain persists, the less likely it is to recover.

Diagnosis

Diagnosis is usually clinical,² though a number of investigations, mostly radiological, have been described.

Radiologically controlled diagnostic intra-articular anesthetic blocks and/or discograms can be used to localize the source of pain to the coccygeal joints,⁶ although the more complex science of false positive and negative blocks for these joints have not been studied, as they have in other anesthetic joint blocks.⁷ Injection can be performed with a 25 gauge needle directed into the joint, and a small dose of contrast is delivered to outline the structure. This is followed by a small volume of local anesthetic and/or steroid. Abolition of the pain confirms the diagnosis.

The coccyx and joints can also be imaged by conventional x-ray, CT scan, and MRI. A dynamic radiological technique that investigates the stability of the sacro-coccygeal joint has also been developed and studied.^{6,8} Two x-rays are taken, one standing and one sitting, and the range of motion of

the sacro-coccygeal joint is determined. Normal range of motion is between 5° and 25°, ² greater flexibility than this constitutes instability of the coccyx, ² which has been identified as a cause of coccydynia.

Plain x-ray may be employed but interpretation is difficult. CT scan may be better. Fracture lines associated with trauma are not readily distinguished in plain x-rays. The morphology of the coccyx also varies widely among the general population, meaning findings such as an angulated or anteverted coccyx may be incidental. ⁹ MRI also provides clear imaging of the tip of the coccyx, along with visualization of dorsal bursitis, cysts, tumors and neural lesions, ² and it is recommended in patients who have neurological features in association with coccydynia. ¹⁰

Psychological assessment has also been recommended. ² One author has reported highly significant correlations between evoked pain and depression, and between coccydynia and evoked pain. ² However, the need for psychological assessment in coccydynia is probably no different from the need in any uncontrolled pain presentation.

Treatment

Conservative treatment

Coccygeal pain due to acute trauma generally responds well to conservative management, ² which includes physical therapy, medication and local injection of anesthetic and steroids.

Medication such as non steroidal anti-inflammatory drugs (NSAIDs) can be trialed early in acute cases. Analgesics may be required to allow the patient to return to work.

Physical treatments include soft tissue massage and joint mobilization. The efficacy of massage has been demonstrated in alleviating anal elevator spasm, which may occur in conjunction with coccydynia. ² Physiotherapy, ultrasound and diathermy treatments have had little success. ² Intra-rectal coccygeal manipulation has also been shown to have limited value. ^{11, 12}

Conservative treatment also includes injection of anesthetic and steroid onto the bone and into the tender regions. In most cases it is easy to insert the 25 gauge needle into the sacro-coccygeal joint as well, but the volume delivered needs to be small (up to 0.2 ml). There is no clear consensus on the optimal site of injection. ¹³ Perhaps better, as it is also useful diagnostically, is injection under x-ray control.

The literature investigating the outcomes of steroid injection is limited, ⁴ though the importance of patient selection to treatment outcomes has been established. Patients with rectal and pelvic pathology should be excluded. ⁴ It has also been suggested that patients with acute coccydynia respond better to steroid injection than those with chronic pain, indicating that this treatment may be most appropriate during the first six months of symptoms. ⁴ However, this statement is often applied to any medical condition, and it probably reflects natural history bias. One RCT has shown that treatment by local injection of methylprednisolone acetate and

bupivacaine is associated with a success rate of 60%. ¹ This has been recommended as a first line treatment. ¹

Additionally, dextrose prolotherapy has been used, and a case series of patients who had failed steroid injection was reported to achieve good pain relief in about 80% of cases. ¹⁴

Caudal epidural injection

Caudal epidural injection has been used for back pain in association with coccygeal pain, but there are no reports of outcome. Where neuropathic features such as burning pain and severe tenderness are observed, caudal epidural injection or sympathetic block of the ganglion impar can be trialed. ¹⁵ However, there are no published outcome data for this treatment.

Surgical treatment

Surgery, in the form of resection of the coccyx or coccygectomy, may be indicated in up to 20% of cases. ¹ Surgery is rarely performed, however, and is offered only to patients with severely debilitating symptoms that are refractory to conservative treatment. ² This modality is likely to alleviate pain that arises from the sacro-coccygeal joint. A typical candidate for surgery would present with unremitting pain following trauma, which is relieved by injection of local anesthetic. Surgery is complex due to the close anterior relation to the rectum.

Reported success rates of coccygectomy vary between 60% and 91%, ^{4, 13, 16-30} though one study has reported no long-term positive results at all. ² Outcomes are improved when patients are limited to those with instability and hypermobility (defined as flexion of greater than 25° in the sitting position) ² of the sacrococcygeal junction. ⁴ It has also been found that patients with moderate to severe degenerative change of the sacrococcygeal junction have better outcomes from coccygectomy than those with mild or no change. ¹³ This finding has led to the suggestion that degeneration of the sacrococcygeal discs may be a factor in the etiology of coccydynia. ¹³

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Evidence-Based Guidelines Improve Performance Measures in Orthopedic Outpatients for Low-Back Pain

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Introduction

General practitioners and the public have the impression that back pain is a condition for which there is a surgical treatment and which, therefore, warrants treatment by orthopedic surgeons. Consequently, patients with back pain constitute a substantial proportion of patients referred to orthopedic outpatients. This load limits the time available for consultants to provide comprehensive and non-surgical care. Meanwhile, evidence-based guidelines for the management of back pain emphasize the need for explanation, assurance, and activation, and the avoidance of passive treatment and the use of investigations.^{1,2} The required management is distinctly medical, and not surgical, in nature.

The present study reports the results of an innovation in which a physician was appointed to provide care for patients with back pain referred to orthopedic outpatients.

Methods

A physician in musculoskeletal medicine conducted four outpatient sessions per week, seeing four new patients and two review patients per session. He conducted the sessions under the auspices of the Director of Orthopaedics, with whom he discussed patients who might require surgical intervention. He provided care according to published evidence-based guidelines.^{1,2}

Data were compared, before and after the intervention, for administrative performance measures such as waiting lists for consultations, duration of waiting time, and growth of waiting lists for surgery. Between September 2003 and August 2008, the physician saw 712 new patients.

Results

Of the 712 patients, only 62 required investigations or surgical opinion. Of these only 19 were placed on the waiting list for surgery: five with hip pain, treated successfully with arthroplasty; four with knee pain also treated surgically; five with internal disc disruption, treated by arthrodesis; three with spinal stenosis, treated by decompression; and 13 with disc herniations, treated by discectomy.

Five other cases were referred to other units because of red flag conditions, including one aortic aneurysm; three with prostatic carcinoma, and one, recently, with a very enlarged uterus due to fibroids (as revealed on MRI).

The remaining 27 patients were referred for interventional pain procedures, and avoided the need for surgery.

The majority of patients (650) did not require surgical con-

sultation or surgery, and were returned to their GP with a plan of management. Upon discharge, these patients expressed their satisfaction with the approach to their management, and were particularly relieved that they did not require surgery. No complaints were received by disgruntled GPs. Rather, when they have been contacted, GPs have consistently expressed their support for the approach used, particularly the reduction in waiting times. Waiting times for appointments were reduced from 5-6 months to 1-2 weeks. Accrual to the waiting list for surgery reduced from 25 to 6 per annum. No patients were returned by their GPs because of inadequate management or for further management.

Interestingly, I have been monitoring a group of elderly patients – over 60 years of age, whose CT scans, as ordered by their GPs – show nothing more than widespread degenerative changes in their lumbar Z joints. While purely anecdotal at this stage, it appears that their back pain is aggravated by activities of daily living that require repetitive twisting activities; for example, sweeping, mopping, vacuuming, hanging out the washing, ironing, as well as social activities such as golf.

Of this group, comprising over 70 patients, I have performed three-month follow-up after giving advice that they should carry out such activities for short periods only. I have so far reviewed 40 of these patients and in over 90% of cases, they have acknowledged that their pain levels are significantly reduced. Additionally, they are able to manage the pain with paracetamol, which is a marked change from the drugs initially prescribed by their GP, including tramadol, and in some cases oral opioids.

Discussion

The burden on orthopedic outpatients from patients with back pain can be reduced successfully by engaging a physician who can provide evidence-based care. This measure satisfies patients and their referring doctors, and substantially improves administrative performance measures. It frees orthopedic surgeons to concentrate on patients who require surgical treatment.

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Imaging Strategies for Low-Back Pain: Systematic review and meta-analysis*

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Summary

Background. Some clinicians do lumbar imaging routinely or in the absence of historical or clinical features suggestive of serious low-back problems. We investigated the effects of routine, immediate lumbar imaging versus usual clinical care without immediate imaging on clinical outcomes in patients with low-back pain and no indication of serious underlying conditions.

Methods. We analysed randomised controlled trials that compared immediate lumbar imaging (radiography, MRI, or CT) versus usual clinical care without immediate imaging for low-back pain. These trials reported pain or function (primary outcomes), quality of life, mental health, overall patient-reported improvement (based on various scales), and patient satisfaction in care received. Six trials (n=1804) met inclusion criteria. Study quality was assessed by two independent reviewers with criteria adapted from the Cochrane Back Review Group. Meta-analyses were done with a random effects model.

Findings. We did not record significant differences between immediate lumbar imaging and usual care without immediate imaging for primary outcomes at either short-term (up to 3 months, standardised mean difference 0.19, 95% CI -0.01 to 0.39 for pain and 0.11, -0.29 to 0.50 for function, negative values favour routine imaging) or long-term (6–12 months, -0.04, -0.15 to 0.07 for pain and 0.01, -0.17 to 0.19 for function) follow-up. Other outcomes did not differ significantly. Trial quality, use of different imaging methods, and duration of low-back pain did not affect the results, but analyses were limited by small numbers of trials. Results are most applicable to acute or subacute low-back pain assessed in primary-care settings.

Interpretation. Lumbar imaging for low-back pain without indications of serious underlying conditions does not improve clinical outcomes. Therefore, clinicians should refrain from routine, immediate lumbar imaging in patients with acute or subacute low-back pain and without features suggesting a serious underlying condition.

Funding. American Pain Society.

Introduction

Studies have consistently shown that clinicians vary widely in how frequently they obtain imaging tests for assessment of low-back pain.^{1–3} In the absence of historical or clinical features (so-called red flags), suggestive of a serious underlying condition (such as cancer, infection, or cauda equina syndrome), the 1994 Agency for Healthcare Policy and Research (AHCPR) guideline made recommendations against lumbar imaging in the first month of acute low-back pain.⁴ These recommendations were based on observational studies that indicated a low frequency of serious conditions in patients without red flags,^{5,6} weak correlation between findings on lumbar imaging studies and clinical symptoms,⁷ high likelihood for acute low-back pain to improve,⁸ and lack of evidence that imaging is helpful for guiding treatment decisions.⁹ Clinical guidelines for acute

low-back pain published after 1994 have consistently recommended a similar approach.¹⁰ Some guidelines have also advised against lumbar imaging for chronic low-back pain without red flags.

Some clinicians still do lumbar-spine imaging routinely or without a clear indication,³ possibly because they aim to reassure their patients and themselves, to meet patient expectations about diagnostic tests, to identify a specific anatomical diagnosis for low-back pain, or because reimbursement structures provide financial incentives to image.^{11–13} However, imaging can be harmful because of radiation exposure (radiography and CT) and risks of labelling of patients with an anatomic diagnosis that might not be the actual cause of symptoms.^{14,15} Furthermore, imaging studies have high direct and indirect costs. Increased frequency of

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lumbar MRI is associated with higher rates of spine surgery, without clear differences in patient outcomes.^{16,17}

Most diagnostic imaging studies quantify test accuracy for the identification of the presence or absence of disease compared with an established reference standard. For low-back pain, such studies are difficult to interpret because no reference standard reliably differentiates symptomatic from asymptomatic spinal imaging abnormalities.^{14,18} Furthermore, studies of diagnostic-test accuracy do not investigate effects on clinical decision making or patient outcomes. By contrast, randomised trials that assess clinical outcomes incorporate effects of test results on subsequent treatments and are regarded as the strongest evidence for the assessment of diagnostic tests.¹⁹

Since the publication of the AHCPR guidelines, several randomised trials of immediate, routine lumbar imaging versus usual clinical care without immediate imaging have been published.^{20–24} In some trials, small differences have been reported in favour of routine imaging, but results have not always been significant. In such situations, meta-analyses can be helpful to assess whether a true difference exists, by increasing statistical power.²⁵ The purpose of this systematic review and meta-analysis was to see whether immediate, routine lumbar-spine imaging is more effective than usual clinical care without immediate lumbar imaging in patients with low-back pain and no features suggesting a serious underlying condition.

Methods

Procedures

We searched Medline (from 1966 to first week of August, 2008) and the Cochrane Central Register of Controlled Trials (third quarter of 2008), with the terms “spine”, “low-back pain”, “diagnostic imaging”, and “randomised controlled trials” (see webpanel online for complete search strategy). We reviewed reference lists for additional citations.

We included randomised controlled trials that compared immediate, routine lumbar imaging (or routine provision of imaging findings) versus usual clinical care without immediate lumbar imaging (or not routinely providing results of imaging) for low-back pain without indications of serious underlying conditions.

These trials assessed at least one of the following outcomes: pain, function, mental health, quality of life, patient satisfaction, and overall patient-reported improvement (table 1). We applied no language restriction. Two reviewers independently assessed potentially relevant citations for inclusion. Disagreements were resolved by consensus. Two independent reviewers abstracted data from trials and assessed quality with modified Cochrane Back Review Group criteria.³¹ We excluded criteria for blinding of patients and providers because of lack of applicability to imaging trials, and the criterion needing similarity of co-interventions because a potential effect of different imaging strategies is to alter subsequent treatment decisions. The remaining eight

criteria and methods to make the criteria operational are shown in the webtable (see online). We resolved disagreements about quality ratings by discussion and consensus. We classified trials that met at least half (four or more) of the eight criteria “higher-quality”, and those that met three or fewer of the eight criteria “lower-quality”. We categorised duration of symptoms as acute (<4 weeks), subacute (4–12 weeks), and chronic (>12 weeks). We contacted authors for additional data if included outcomes were not published, or if median (rather than mean) outcomes were reported.

Statistical analysis

Primary outcomes were improvement in pain or function.³² Secondary outcomes were improvement in mental health, quality of life, patient satisfaction, and overall improvement. Other than overall improvement, which was assessed as a dichotomous variable with various scales (table 1), all other outcomes were assessed as continuous variables. We categorised outcomes as short term (≤ 3 months), long term (> 6 months to ≤ 1 year), or extended (> 1 year).

We calculated pooled estimates and 95% CIs with the DerSimonian-Laird random effects model.³³ We chose this model because trials differed in patient populations (eg, duration of low-back pain and presence of sciatica symptoms), type of imaging intervention (lumbar radiography, MRI, or CT), and other factors. For continuous outcome measures, we calculated standardised mean differences (SMDs, Hedge's d) of interventions for changes between baseline and follow-up scores. We needed correlations between baseline and follow-up score to calculate corresponding SDs, but these were not reported or calculable in most trials. We used the correlation obtained from one trial²¹ to estimate SDs for the other trials. If a study assessed pain or function with more than one method, we used the short-form-36 (SF-36) bodily pain score for pain and the Roland disability questionnaire (RDQ) for primary analyses. We analysed pain and function measures so that lower scores indicated better outcomes. For quality of life and mental health, higher scores indicated improved outcomes. We calculated weighted mean differences (WMDs) for subgroups of trials reporting the same pain or function outcomes. We excluded from the main analysis trials that did not report SDs for included outcomes or sufficient data to impute³⁴ them. When a trial reported only median data, we analysed results with the median value instead of the mean, and estimated the SD with the interquartile difference. When both mean and median data were available, we used mean values in the primary analyses. Although one trial reported results adjusted for differences in baseline factors,²¹ we calculated unadjusted results to enter into the meta-analyses to be consistent with the other trials.

Statistical heterogeneity was assessed by Cochran's Q test and the I^2 statistic.³⁵ Because of small numbers of trials that could be pooled (maximum four trials), we did not construct L'Abbé plots³⁶ or assess for publication bias.³⁷ For outcomes that could not be pooled, we assessed results qualitatively.

	Interventions	Number of randomised patients	Exclusion criteria related to markers for serious underlying conditions	Duration of low-back pain episode	Signs of nerve-root entrapment or spinal stenosis	Duration of follow-up	Main outcome measures	Country
Djais and Kalim ²⁰	Immediate lumbar-spine radiography vs usual clinical care without lumbar radiography	101	Age>55 years History of cancer Unexplained weight loss or fever Use of oral corticosteroids History of tuberculosis Intravenous drug use Symptoms or signs of cauda equina syndrome	<3 months (median 4 weeks, IQR 2 to 9.5)	Excluded	3 weeks	Pain: VAS (0 to 10) Back-specific function: RDQ (0 to 24) Quality of life: EuroQol-5D (–0.59 to 1) Overall improvement (dichotomous): overall assessment (much improved vs other)	Indonesia
Modic et al ²⁴ and Ash et al ²⁶	Lumbar MRI in all patients, notification of results within 48h vs notification only if clinically indicated	246	Signs or symptoms of cauda equina syndrome Polyradiculopathy History of blunt trauma, previous low-back surgery Use of oral or parenteral corticosteroids	<3 weeks	39%	6 weeks and 1 year	Pain: VAS (0 to 10) and SF-36 bodily pain Back-specific function: RDQ (0 to 24) Mental health: SF-36 mental health subscale (0 to 100) Overall results (dichotomous): patient symptom assessment (very pleased or better)	USA
Gilbert et al ^{21,27}	Immediate lumbar MRI or CT vs usual clinical care without advanced imaging	782	Need of immediate referral for imaging (eg, surgical intervention, those with red flags [definition of red flags not reported])	18% <3 months 42% 3–12 months 40% >12 months	32%	8 months and 2 years	Pain: SF-36 bodily pain Back-specific function: Aberdeen low-back pain score (0 to 100) Quality of life: EuroQol-5D (–0.59 to 1) Mental health: SF-36 mental health subscale (0 to 100)	UK
Kerry et al ^{23,28}	Immediate lumbar-spine radiography vs usual clinical care without lumbar radiography	153	Not specified (clinicians informed of the Royal College of Radiologists' 1995 guidelines but randomisation left to their discretion)	70% <8 weeks	Not reported	6 weeks and 1 year	Pain: SF-36 bodily pain Back-specific function: RDQ (0 to 24) Quality of life: Euro-Qol subjective score (0 to 100) Mental health: SF-36 mental health subscale (0 to 100) Patient satisfaction: categorical scale (four categories, dissatisfied to very satisfied)	UK
Kendrick et al ^{22,29}	Immediate lumbar spine radiography vs usual clinical care without lumbar radiography	421	Age >55 years Chronic (>6 months) low-back pain Unexplained weight loss or fever Use of oral steroids History of cancer, tuberculosis, or HIV infection Signs or symptoms of cauda equina syndrome	>6 weeks and <6 months (median 10 weeks, IQR 7 to 15)	44% (lower-limb pain)	3 months and 9 months	Pain: VAS (0 to 10) Back-specific function: RDQ (0 to 24) Quality of life: EuroQol-5D (–0.59 to 1) Overall results (dichotomous): presence of pain (no longer has pain vs pain still present) Patient satisfaction: patient satisfaction score (9–27)	UK
Deyo et al ³⁰	Immediate lumbar spine radiography vs educational intervention plus lumbar spine radiography if no improvement within 3 weeks	101	Age >50 years Temperature >37.8°C Substantial trauma Neuromotor deficits Unexplained weight loss Alcohol or parenteral drug abuse History of cancer Use of corticosteroids	Mean 2 weeks	24% nerve-root irritation	3 weeks and 3 months	Pain: categorical scale (1 to 6) Function: sickness impact profile (0 to 100) Overall results (dichotomous): return to normal activities (returned to normal activities vs not returned to normal activities) Patient satisfaction: patient satisfaction score (9 to 27)	USA

VAS = visual analogue scale. RDQ = Roland disability questionnaire

Table 1. Characteristics of randomised trials

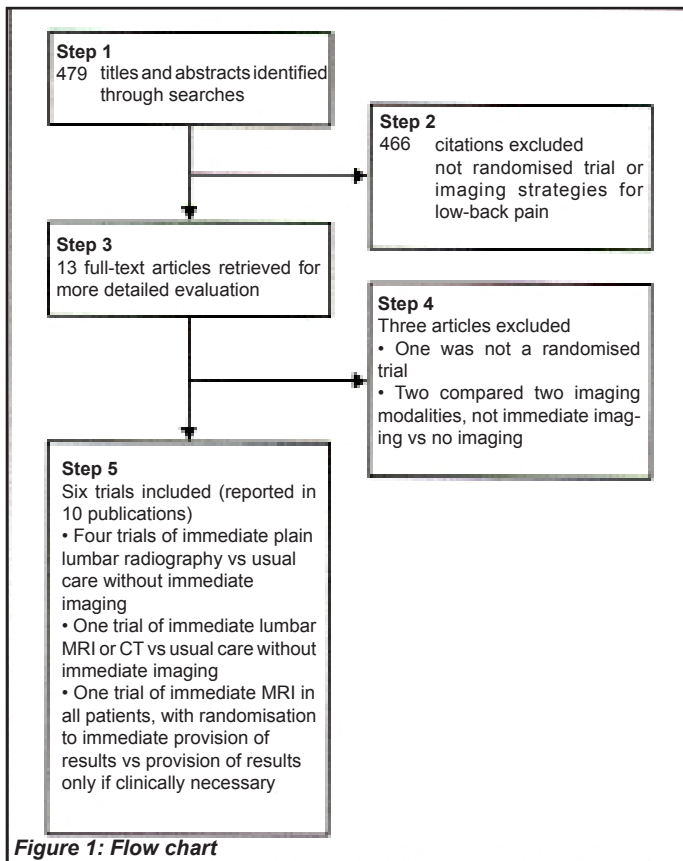
We did meta-regression on primary outcomes (pain and function) to assess whether duration of pain (mainly acute or subacute vs mainly chronic low-back pain), overall trial quality (higher quality vs lower quality), or imaging technique (radiography vs MRI or CT) could explain variation between studies. Because the number of trials was small, we interpreted meta-regression results cautiously. We did sensitivity analyses on the correlation between baseline and follow-up scores by assessing values from 0 to 0.8, substituted primary pain or function outcomes with other reported measures, median with mean data when reported, and adjusted with unadjusted results when available. We also investigated how including trials that did not provide data to impute SDs could affect results by assuming various plausible values for SDs (from values one-eighth the mean to equivalent to

the mean). All analyses were done with Stata version 10.0 (StataCorp, College Station, TX, USA).

We regarded SMDs of 0.2 to 0.5 as small; 0.5 to 0.8 as moderate; and greater than 0.8 as large.³⁸ For WMDs, we regarded mean improvements of 5–10 points on a 100-point scale (or equivalent) as small; 10–20 points as moderate; and more than 20 points as large.³⁹ For the RDQ (the most commonly reported measure of back-specific function), we classified mean improvements of 1–2 points as small and 2–5 points as moderate.⁴⁰

Role of the funding source

The sponsor of the study had no role in the design and conduct of the study; data collection, management, analy-



sis, and interpretation of the data, preparation, review, or approval of the manuscript; or the decision to submit the article for publication. RC had full access to all data in the study, and had final responsibility for the decision to submit for publication.

Results

Figure 1 shows the flow chart of studies from initial results of publication searches to final inclusion or exclusion. Of the six trials that met inclusion criteria, four, reported in six publications, assessed lumbar radiography^{20,22,23,28–30} and two, reported in four publications, assessed MRI or CT.^{21,24,26,27} We excluded two randomised trials that compared rapid MRI with plain radiography^{16,41} and one non-randomised study.⁹

1804 patients were randomly assigned in six trials.^{20–24,30} Five of the six trials were done in the UK^{21–23} or USA.^{24,30} Duration of follow-up ranged from 3 weeks²⁰ to 2 years.²¹ One trial excluded patients with sciatica or other symptoms of radiculopathy,²⁰ and one did not report the proportion of patients with such symptoms.²³ In the other four trials,^{21,22,24,30} the proportion of patients with sciatica or radiculopathy ranged from 24% to 44%.

	Randomisation	Allocation concealment	Baseline-group similarity	Blinded outcome assessor	Acceptable compliance in all groups	Described and acceptable drop-out rate	Similar timing of outcome assessment in all groups	Intention-to-treat analysis	Total score†
Djais ²⁰	Yes	No	..	No	Yes	No	2
Modic ²⁴ and Ash ²⁶	..	Yes	Yes	..	Yes	No	Yes	No	4
Gilbert ^{21,27}	Yes	Yes	No	Yes	..	Yes	Yes	Yes	6
Kerry ^{23,28}	..	Yes	No	No	Yes	Yes	Yes	No	4
Kendrick ^{22,29}	..	Yes	Yes	No	Yes	Yes	Yes	Yes	6
Deyo ³⁰	Yes	..	Yes	No	Yes	No	Yes	Yes	5
Number of trials meeting criteria	2	4	4	1	4	3	6	3	..

..=insufficient information to assess if trial adequately meets criteria. *Based on modified Cochrane Back Review Group criteria, excluding criteria for blinding of patients and providers, and similarity of co-interventions. †Maximum score is 8.

Table 2. Quality assessment of randomised trials*

	Short-term (≤3 months) SMD	Test for heterogeneity	Long-term (>6 months to ≤1 year) SMD	Test for heterogeneity
Pain	0.19 (−0.01 to 0.39), three trials ^{20,23,24}	Q=1.15, I ² =0%, df=2, p=0.51	−0.04 (−0.15 to 0.07), four trials ^{21–24}	Q=3.16, I ² =5%, df=3, p=0.37
Function	0.11 (−0.29 to 0.50), three trials ^{20,23,24}	Q=7.09, I ² =72%, df=2, p=0.03	0.01 (−0.17 to 0.19), four trials ^{21–24}	Q=6.49, I ² =54%, df=3, p=0.09
Quality of life	−0.10 (−0.53 to 0.34), two trials ^{20,23}	Q=2.30, I ² =57%, df=1, p=0.13	−0.15 (−0.33 to 0.04), three trials ^{21–23}	Q=4.04, I ² =50%, df=2, p=0.13
Mental health	0.12 (−0.37 to 0.62), two trials ^{23,24}	Q=4.63, I ² =78%, df=1, p=0.03	0.01 (−0.32 to 0.34), three trials ^{21,23,24}	Q=7.81, I ² =74%, df=2, p=0.02
Overall improvement	RR 0.83 (0.65 to 1.06), four trials ^{20,22,24,30}	Q=4.54, I ² =34%, df=3, p=0.21	RR 0.82 (0.64 to 1.05), one trial ²²	Not applicable

Data are mean (95%CI). RR=relative risk. SMD=standardised mean difference.

Table 3. Main outcomes

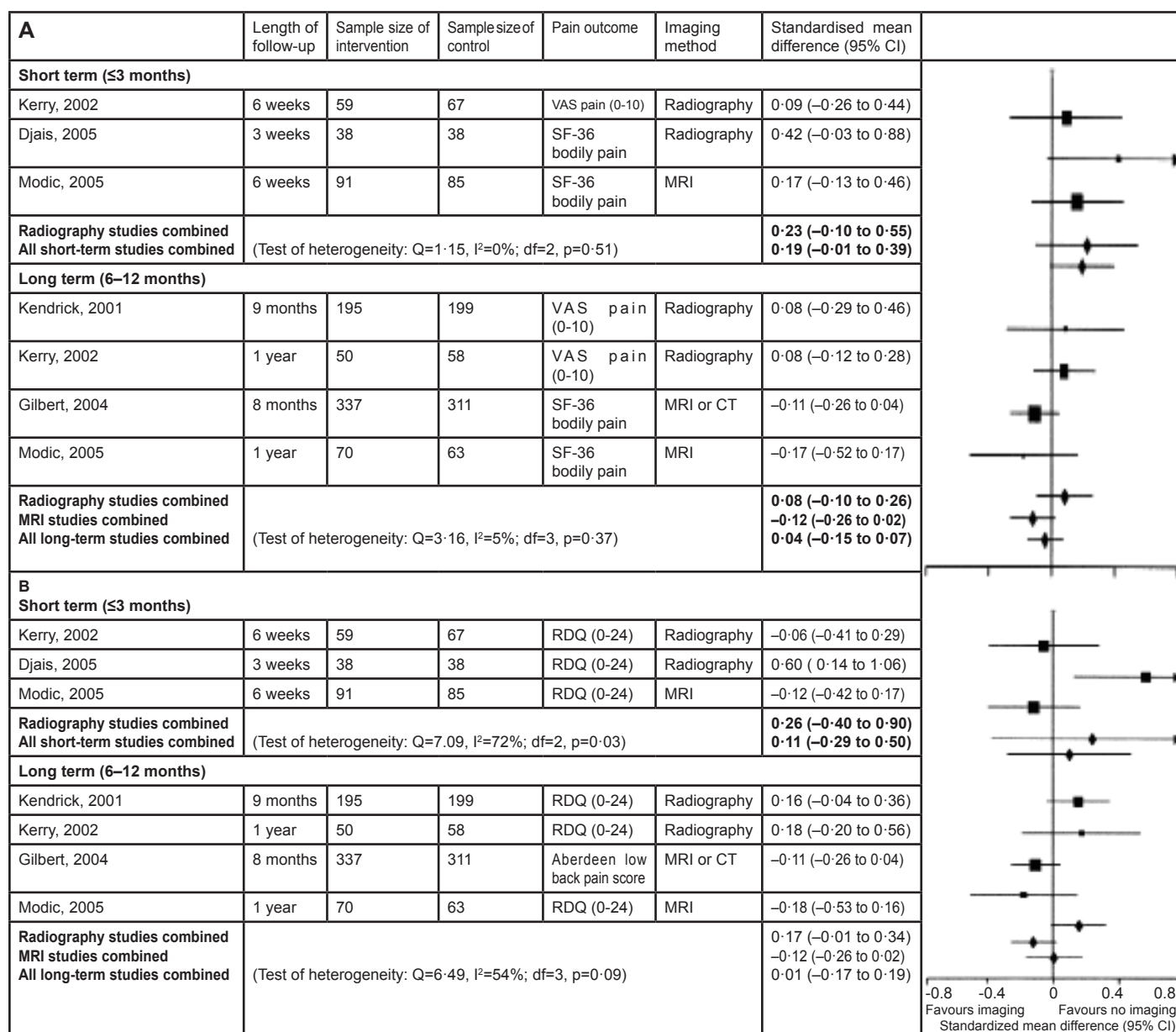


Figure 2: Improvement in pain (A) and function (B) for immediate lumbar imaging versus usual clinical care without immediate imaging

RDQ=Ronald disability questionnaire. VAS=visual analogue scale. The arrow indicates that the upper limit of the confidence interval extends beyond a standardized mean difference of 0.8.

Three trials^{20,22,23} compared immediate lumbar radiography with usual clinical care without immediate lumbar radiography, and one³⁰ compared immediate lumbar radiography with a brief educational intervention plus lumbar radiography, if no improvement was seen by 3 weeks. Patients enrolled in these trials had mainly acute or subacute (<12 weeks) low-back pain (table 1), and all trials were done in primary-care or urgent-care settings.

Two studies^{21,24} assessed advanced imaging modalities. One study²¹ compared immediate MRI or CT with usual clinical care without advanced imaging in patients with mainly chronic low-back pain (82% had low-back pain for >3 months) referred to a surgeon, whereas in the other study²⁴ all patients with low-back pain for less than 3 weeks underwent MRI, with randomisation to routine notification of results within 48 h versus notification of results only if clinically indicated. Patients were recruited from various settings (primary care, spine clinic, or emergency room). In

both trials, the proportion of patients who underwent lumbar radiography before enrolment was not reported.

Five trials^{21–23,26,30} met at least four of eight predefined quality criteria, and were classified as higher quality (table 2). Two investigators agreed on all quality ratings, apart from those about baseline-group similarity for one trial²⁴ and use of intention-to-treat analysis for another trial.³⁰ The most frequent methodological shortcoming was lack of (or unclear use of) blinded outcome assessment (five of six trials), followed by inadequate description of randomisation method (four of six trials).

All trials excluded patients with features suggestive of a serious underlying condition, but exclusion criteria varied (table 2) and trials did not indicate the number of patients excluded because of such factors. In one trial,²³ 95 of 506 patients who were not randomly assigned were referred for lumbar radiography, but reasons for imaging were not explained. All trials assessed improvement in pain and

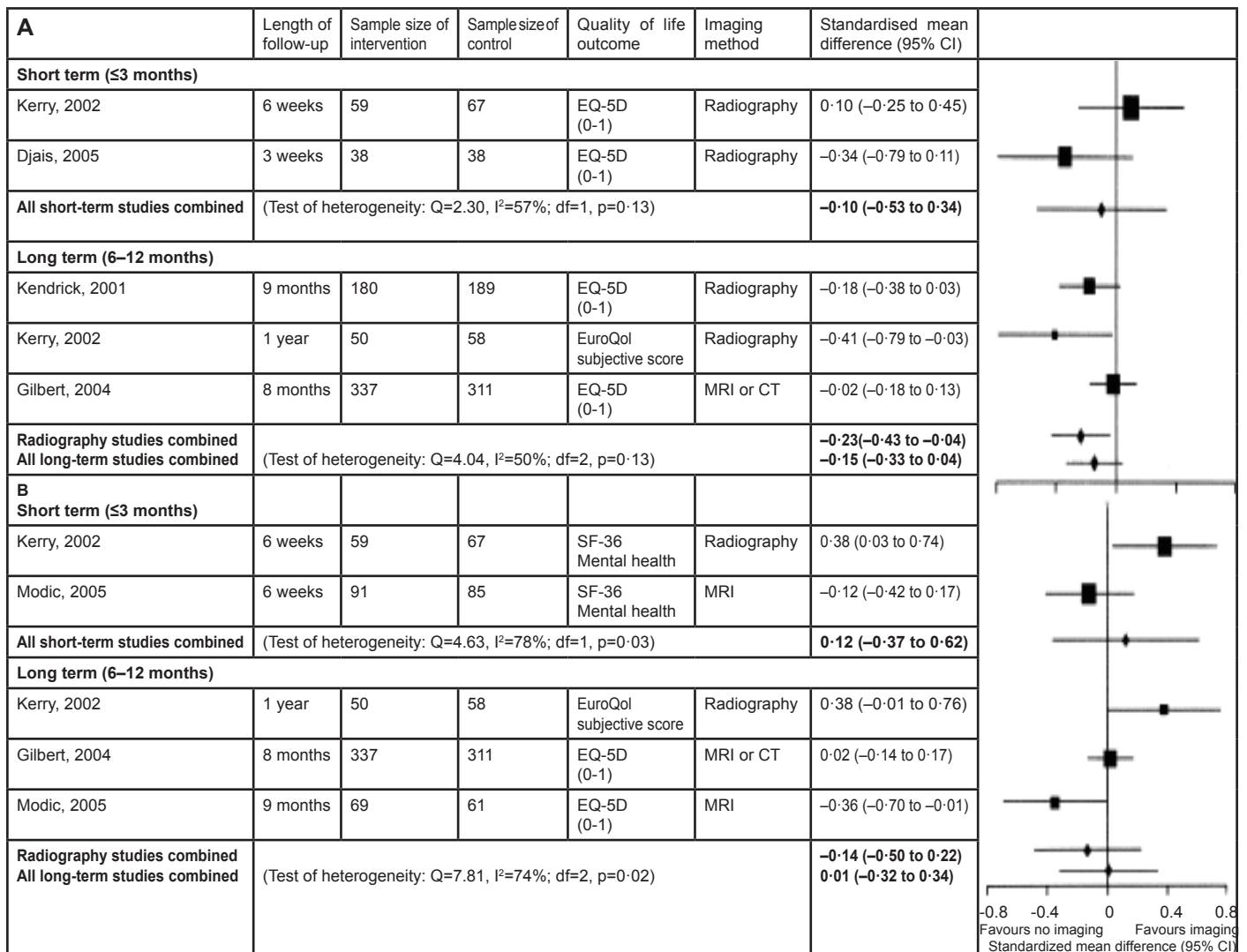


Figure 3: Improvement in quality of life (A) and mental health (B) for immediate lumbar imaging versus usual clinical care without immediate imaging

function, and four^{20,22,24,30} reported overall improvement, but varied in the methods used to assess these and other outcomes (table 1).

Two trials^{20,22} reported median rather than mean data for outcomes. We obtained unpublished mean outcome data for one²² of these trials. Five trials^{20–24} could be included in the primary meta-analysis on improvement in pain or function at one or more follow-up intervals, and one³⁰ did not report baseline pain data or provide data to impute SDs.

We did not note any significant difference between routine, immediate lumbar imaging and usual clinical care without immediate imaging for improvement in pain or function at short-term or long-term follow-up (table 3 and figure 2), although several results slightly favoured non-immediate imaging (positive values). Heterogeneity was not present. Improvement (calculated as WMDs) in pain at short-term follow-up slightly favoured no immediate imaging in trials that used a visual analogue (0 to 10) pain scale (WMD 0.62, 95% CI 0.03 to 1.21),^{20,24} but was not significantly different in trials that used the SF-36 bodily pain score (2.99, −2.04 to 8.03).^{23,24} For long-term pain, immediate imaging and usual clinical care without immediate imaging did not differ

in trials reporting either a visual analogue pain scale (0.08, −0.11 to 0.27)^{22,24} or the SF-36 bodily pain score (−2.14, −5.10 to 0.80).^{21,23,2}

Figure 2 also shows improvement in function for short-term and long-term follow-up. Heterogeneity was present at both short-term and long-term follow-up. For short-term function, heterogeneity seemed due to inclusion of a lower-quality trial that only reported median outcome data.²⁰ However, the exclusion of this trial did not change the conclusion of no difference between imaging strategies. For long-term follow-up, heterogeneity seemed due to imaging type ($p=0.012$ for lumbar radiography vs MRI or CT in meta-regression analysis). Results remained statistically and clinically non-significant (figure 2) after trials were stratified according to whether they assessed lumbar radiography, or MRI or CT, although heterogeneity was no longer present ($I^2=0\%$ for both analyses).

All three trials^{20,23,24} included in the analysis for short-term function used the RDQ, with a WMD of 0.48 points (95% CI −1.39 to 2.35) for immediate imaging versus usual clinical care without immediate imaging. In the three trials that reported long-term function with the RDQ,^{22–24} the WMD

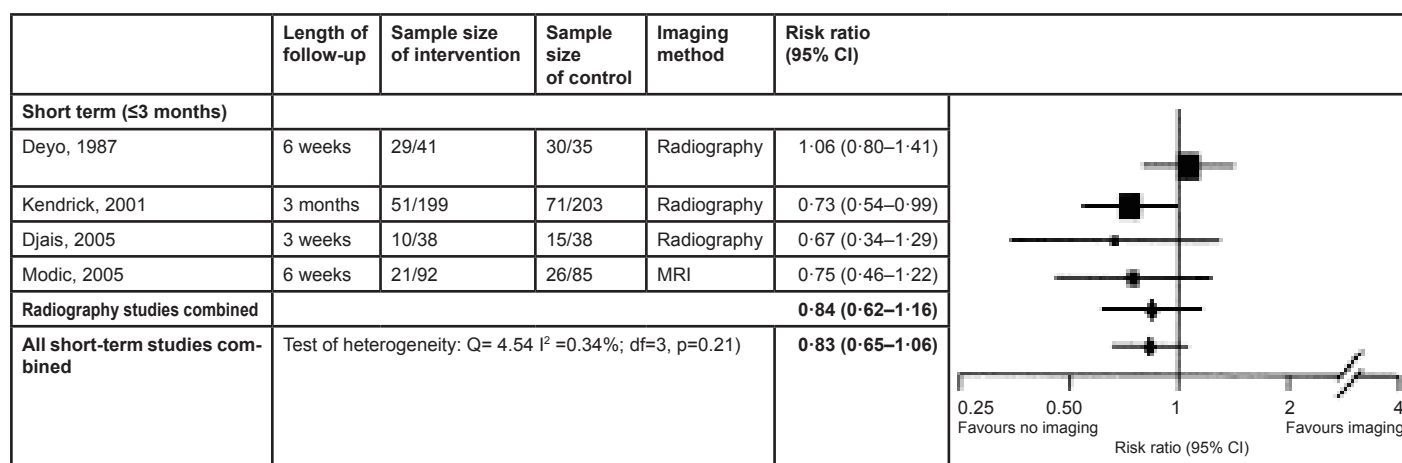


Figure 4: Overall improvement for immediate lumbar imaging versus usual clinical care without immediate imaging

was 0.33 points (−0.65 to 1.32).

Only one trial²¹ reported pain or function at extended (2-year) follow-up. On the basis of calculated, unadjusted analysis, immediate lumbar MRI or CT did not differ from usual clinical care without immediate lumbar imaging for improvement in SF-36 bodily pain score (mean difference −2.7, 95% CI −6.19 to 0.79) or the Aberdeen low-back pain score (−1.6, −4.04 to 0.84). Immediate MRI or CT caused small but significant improvements in pain and function when results were adjusted for age, sex, diagnostic category (radiculopathy due to herniated disc or degenerative disease, neurogenic claudication, or other low-back pain), and clinician, although groups did not differ in these factors (adjusted mean difference on the SF-36 bodily pain score −5.14, −8.67 to −1.61, and on the Aberdeen low-back pain score −3.62, −5.92 to −1.32).

In meta-regression analyses, trial quality and duration of low-back pain were not good predictors of differences in estimates for either pain or function. Imaging type (MRI or CT vs lumbar radiography) was not a good predictor of differences in estimates for pain. Estimates were similar when we substituted median with mean outcome data from one trial,²² adjusted with unadjusted results from another trial,²¹ and when we used various plausible values for the correlation between baseline and follow-up scores for trials that did not report these data. Results of short-term function were unchanged when we included a trial in which SDs were not reported,³⁰ by assuming a broad range of plausible values. For example, with an SD equivalent to half the mean, immediate, routine lumbar imaging and non-immediate lumbar imaging did not differ (SMD 0.08, 95% CI −0.20 to 0.37).^{20,23,24,30}

Immediate lumbar imaging and usual clinical care without immediate imaging did not differ for short-term or long-term quality of life, mental health, and overall improvement (table 3, and figures 3 and 4). For quality of life, results slightly favoured non-immediate imaging (negative values, figure 3).

In the trial that reported extended (2-year) follow-up data, immediate MRI or CT was not better than usual clinical care without immediate imaging on either the EuroQol-5D (mean difference 0.02, 95% CI −0.02 to 0.07, 0 to 1 scale) or the SF-36 mental health score (−1.50, −4.09 to 1.09, 0 to 100

scale) in unadjusted analyses.²¹ However, results slightly favoured immediate MRI or CT on the EuroQol-5D after adjustment for age, sex, diagnostic category, and clinician (adjusted mean difference 0.06, 0.01 to 0.10).

We were unable to pool data for patient satisfaction from three trials.^{22,23,30} One trial²³ showed no difference between immediate lumbar radiography and usual clinical care without radiography in the proportion of patients who were satisfied or very satisfied (78% vs 70%). Another trial²² showed no difference based on the patient satisfaction score (minimum score 9, maximum 27) after 3 months (median 20 vs 21, favouring usual clinical care, $p=0.13$), but immediate imaging was better after 9 months (median 21 vs 19, $p<0.01$). Another trial³⁰ also used the patient satisfaction score, and showed no difference between immediate lumbar radiography and an educational intervention without radiography, but only assessed outcomes after 3 weeks (mean 23.7 vs 24.0).

Four trials ($n=399$) obtained imaging in all patients²⁴ or recorded low-back pain diagnoses based on clinical follow-up through at least 6 months of follow-up.^{22,23,30} No cases of cancer, infection, cauda equina syndrome, or other serious diagnoses were reported in patients randomly assigned to any imaging strategy.

Discussion

Our meta-analysis of randomised controlled trials showed that immediate, routine lumbar-spine imaging in patients with low-back pain and no features suggesting serious underlying conditions did not improve clinical outcomes compared with usual clinical care without immediate imaging. Results were limited by small numbers of trials for some analyses, but seemed consistent for the primary outcomes of pain and function, and for quality of life, mental health, and overall improvement. Data for patient satisfaction could not be pooled, but showed no clear difference. In addition to non-significance, pooled estimates were small or close to zero and, in some cases, slightly favoured the non-imaging strategy. This result suggests that, even if statistical power could be increased by other trials, clinically important ben-

efits from routine lumbar imaging are unlikely, assuming that future results are similar to those currently available. Based on lower limits of 95% CIs, maximum plausible benefits on pain or function with routine imaging would be small (SMD 0.29 for short-term function) or trivial (SMD <0.2).

Several trials also showed no serious underlying conditions in patients without risk factors for these conditions.^{22–24,30} These results should be interpreted cautiously, because identification of serious conditions was not a primary outcome in any trial; most trials relied on routine clinical follow-up to identify these conditions, and the trials enrolled a total of less than 400 people. However, findings are in line with large observational investigations.^{5,9,42} For example, a prospective study of 1975 patients in a walk-in clinic showed no cases of cancer in 1170 patients under the age of 50 with no history of cancer, no weight loss, or other sign of systemic illness, and no history of failure to improve with conservative therapy.⁵

Data for any outcome beyond 1 year of follow-up are sparse. One trial²¹ showed that immediate lumbar MRI or CT was better than usual clinical care without immediate imaging for pain, function, and quality of life in patients mainly affected by chronic low-back pain for 2 years. However, benefits averaged only 3–5 points on a 100-point scale, and were only present when results were adjusted for sex, age, diagnostic category, and clinician.

The need to adjust results in this trial is unclear, because factors that were adjusted for were similar in the two groups. The recorded discrepancy could be related to reliance on estimated correlations between baseline and follow-up scores to calculate unadjusted results compared with use of direct data in the adjusted analyses. Nonetheless, meta-analyses for shorter-term outcomes that were included in this trial were similar when we substituted adjusted with unadjusted results.

This meta-analysis compared imaging strategies for assessment of low-back pain. In addition to lack of clinical benefit, lumbar imaging is associated with radiation exposure (radiography and CT),⁷ may not affect diagnostic or treatment plans,⁴³ increases direct costs,^{21–23} and may lead to increased use of expensive but potentially unnecessary invasive procedures.¹⁷ In this study, we assessed effects of different imaging strategies on the basis of randomised controlled trials that reported patient outcomes and not on the basis of trials that assessed intermediate outcomes, such as diagnostic accuracy or effects on clinical decision making.¹⁹ Similar trials that assess patient outcomes could be done to investigate other diagnostic tests with uncertain clinical utility, such as provocative discography and various diagnostic blocks.

Our study has several limitations. First, the trials included are clinically diverse, and varied in the type of imaging modality or strategy assessed, the duration of low-back pain in enrollees, and trial quality. However, other trials^{16,41} have shown no difference between immediate lumbar MRI and radiography, suggesting that pooling trials that investigate these modalities is reasonable. We also used a random effects model, which leads to more conservative estimates

(wider CIs) when statistical heterogeneity is present,²⁵ and did meta-regression analyses, which showed that predefined methodological and demographic factors had no major effects on overall estimates or conclusions, although results were based on a small number of trials. Second, we pooled trials that assessed different pain or function measures, which could introduce heterogeneity. However, conclusions were similar when we analysed trials that reported the same outcome measure. Finally, we were unable to assess effects of baseline patient characteristics on estimates because we did not have access to individual patient data. Results of a trial²¹ that assessed results stratified according to presence of lumbar-disc herniation or nerve-root entrapment were not different compared with overall trial results.

We identified several factors related to the management and reporting of randomised trials of lumbar imaging that could be improved. First, all trials had methodological shortcomings. Future trials should describe randomisation methods in more detail, use blinded outcome assessors, and report intention-to-treat analyses.⁴⁴ Second, assessment and reporting of outcomes was not well standardised. For example, function was measured with three different scales in six trials, and only three trials measured patient satisfaction with two different methods. Availability of scarce and inconsistent data for patient satisfaction is particularly relevant because one study⁴⁵ showed that routine lumbar radiography could be cost effective, depending on how highly patient satisfaction is valued. More standardized methods for reporting outcomes based on published recommendations would greatly help future analyses.³² Third, assessment of applicability of imaging trials was difficult.⁴⁶ These trials used different criteria for excluding patients with risk factors, and none explicitly indicated the number excluded because of features suggestive of serious underlying conditions. Improved reporting of the number of patients from initial screening through randomisation would help to clarify how much trial results are likely to relate to general practice. Finally, trials of MRI or CT did not report how many patients had previously undergone lumbar radiography.^{21,24} Whether these trials truly assessed MRI or CT versus no imaging, or the incremental benefit of advanced imaging in patients who were already examined with lumbar radiography, is not clear.

Our study confirmed that clinicians should refrain from routine, immediate lumbar imaging in patients with low-back pain and without features suggesting a serious underlying condition.^{47–49} Conclusions mainly apply to patients with acute or subacute, non-specific low-back pain assessed in primary-care settings. Results from one trial²¹ suggested that MRI or CT might also not be routinely indicated for chronic low-back pain because of unclear or small benefits. However, more studies are needed to identify best possible imaging strategies in patients with chronic low-back pain, symptoms of radiculopathy or spinal stenosis, patients assessed in referral settings, and other specific subgroups.

Rates of utilisation of lumbar MRI are increasing,⁵⁰ and implementation of diagnostic-imaging guidelines for low-back pain remains a challenge. However, clinicians are

more likely to adhere to guideline recommendations about lumbar imaging now that these are supported by consistent evidence from higher-quality randomized controlled trials.⁵¹ Patient expectations and preferences about imaging should also be addressed, because 80% of patients with low-back pain in one trial²² would undergo radiography if given the choice, despite no benefits with routine imaging. Educational interventions could be effective for reducing the proportion of patients with low-back pain who believe that routine imaging should be done.³⁰ We need to identify back-pain assessment and educational strategies that meet patient expectations and increase satisfaction, while avoiding unnecessary imaging.

Contributors

RC participated in the conception, design, and drafting of the article. All authors participated in analysis and interpretation of data, revision of the article, and gave final approval of the version to be published. RC had responsibility for the integrity of the data and the accuracy of the analysis.

Conflict of interest statement

We declare that we have no conflict of interest.

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Sustained Segmental Post-Isometric Relaxation (SSPIR): A new effective treatment for neck pain and headache?

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Abstract

Background and purpose. Patients with chronic headache and neck pain often were found to have continuing dysfunction in the cervical spine. The purpose of this study is to determine the effectiveness of a specific mobilization technique, sustained segmental post-isometric relaxation (SSPIR), for treatment of these patients.

Subjects. There were 27 consecutive subjects with chronic neck pain.

Methods. A specific mobilization technique was used. The technique was repeated at each follow-up, with a specific home-exercise prescribed between consultations.

Results. Nineteen patients reported improvement to 85-100% of normal at one-year follow-up. Six relapsed after initial improvement and continued to have pain at one year. None was worse after treatment than at entry. One was lost to follow up.

Discussion. The results suggest effectiveness of the treatment but there are significant sources of bias.

Conclusion. The apparent effectiveness of this mobilization technique warrants further study.

Summary. A case series of 27 consecutive chronic neck pain patients from the author's practice who had symptoms of neck pain or headache for a mean of 40 months were treated on average twice with a specific treatment technique. At telephone follow up, a minimum of a year later, 19 (70%) reported improvement to 85-100% of normal. While the study has a number of potential areas for criticism, the results warrant further investigation.

Introduction

Patients who presented with chronic headache and neck pain often were found to have continuing dysfunction in the cervical spine despite previous treatment.

When treated with a specific mobilization technique (SSPIR), the pain, together with the dysfunction frequently settled. The question remained whether this improvement could be maintained. Accordingly, a case series study was undertaken to test the efficacy of SSPIR for the management of chronic neck pain.

Dysfunction is defined for this article as impaired or altered function of a particular segment of the vertebral column and is determined by palpatory assessment of the range of rotation in response to a small impulse delivered through the transverse process.

The practice setting was a group general medical practice with four practitioners and approximately 9000 patients. The author had been practising manual medicine for over 20 years, receiving referrals from colleagues in primary care, secondary care, and patient self-referral by word of mouth.

Headache, neck pain, and presumably dysfunction had been present in the study population from 8 weeks to 18 years before referral (Table 1). Treatment given prior to the patients' presentation generally included high velocity, low amplitude thrust, and had failed to provide long-standing relief in these particular cases.

Patients included were those with clinical dysfunction of

the cervical spine.

The treatment given consisted of localized mobilization of the dysfunctional segment. Such treatment was repeated at follow up until the patient or the therapist felt that no further benefit could be achieved. In between times the patient was instructed to perform a home exercise designed to maintain the improved mobility. This treatment resulted in subjectively assessed relief of at least 85% of the persisting symptoms in 70% of the study population at follow up one year later.

This outcome runs contrary to the published evidence which shows that manipulative treatment is of no significant benefit in chronic neck pain.^{1,2}

There is little evidence that treatment of established dysfunction is beneficial,³ although there are studies which show that range of motion can be improved by manipulation.⁴

Vernon et al⁵ found in their study of cervicogenic dysfunction in muscle contraction headache and migraine that by far the majority of the symptoms arose from the upper cervical region from C0 to C3 and the upper cervical muscles. They concluded that the neck plays an important but largely ignored role in the manifestation of adult benign headache. Graff-Radford et al⁶ reported finding trigger points and underlying joint dysfunctions especially in the upper cervical spine in chronic head and neck pain. The upper cervical region is implicated frequently in other studies.^{7,8}

Aim

The aim of this study is to determine at one year follow-up whether chronic neck pain, present for more than eight weeks, can be relieved in the long term by manual therapy.

Method

Twenty-seven patients presenting consecutively with neck stiffness and/or headache of greater than eight weeks' duration entered the study. The mean duration of symptoms prior to presentation was 40 months. The longest duration was 18 years (Table 1).

Each subject was examined for range of rotation in each direction using a goniometer. Palpation of the cervical spine and related muscles was performed examining for dysfunctional segments, tender points, and trigger points. The dysfunctional segment was identified clinically, by assessing range of motion and by palpation, and was then mobilized using a specific post-isometric relaxation technique. Mobilization was repeated until the segment felt normal. Rotation was then re-measured with a goniometer.

Change from entry was classified as follows:

- +++++ - improvement to normal, with disappearance of symptoms
- ++++ - slight remaining symptoms or less than 5 degrees persisting loss of rotation
- +++ - mild remaining symptoms or 5-10 degrees persisting loss of rotation
- ++ - moderate remaining symptoms or 10-15 degrees persisting loss of rotation
- +
-
- - worse.

Lifestyle factors such as posture and stresses were discussed, and advice about avoiding or minimizing these was given.

A home exercise involving a similar rotational technique was given to each patient, with instruction to perform it at least four times a day until seen again.

Treatment was repeated within two weeks and further as required until either the patient or the therapist was happy that satisfactory resolution had been achieved, or that no progress was being made. Twenty-two subjects required only one or two treatments. The maximum number of treatments given was 13 (Table 1).

Patients were followed up by telephone contact by my practice nurse not less than a year after the final treatment.

A year after the date of entry of the last person into the study, the subjective state was assessed. Classification was similar to that recorded above. Normal was classified as +++++, slight remaining symptoms +++++, mild remaining symptoms +++, moderate rated ++, slight improvement +, no lasting change -, and worse --. Subjects were then asked to assign to their symptoms a percentage figure relative to normal.

Pertinent clinical features and results are listed in Table 1.

Description of technique

Treatment is by firm segmental mobilization. The patient lies supine. The neck is resting on a slim pillow, in neutral position. The transverse process of the lower vertebra of the segment (column B) is fixed by a finger placed over the posterior aspect of the articular pillar on the side of restricted motion. The upper vertebra of the segment along with the upper column (column A) is then rotated towards the restriction by the other hand, which is placed on the opposite side of the forehead. This rotation is taken to the end range of motion. The patient is then asked to turn away from the restriction while inhaling and then holding their breath. The segment is held in this position for 10 seconds, while the finger on column B applies an anterior, cephalic, and medially directed force, following the joint line. The patient is then asked to relax and exhale. This respiratory enhancement is called "respiratory synkinesis". The segment is firmly rotated towards the restriction, following it to its new "barrier" of motion. "Barrier" here means the end point of motion beyond which the segment could not be moved. This release generally takes approximately 10-20 seconds. The mobilization is repeated up to three times until no further gain occurs. The total rotation of the neck is measured again.

Following mobilization a specific home exercise using a similar rotational technique, including respiratory synkinesis, is taught and the patient is asked to perform it in front of the therapist.

Description of the home exercise

This exercise requires the patient to turn the head fully to the restriction. The hand opposite the restriction is placed against the cheek on the same side and holds the head against the restriction. The patient then applies firm pressure away from the restriction, towards the resisting hand. Absolutely no movement from the restriction may be allowed. Again they use respiratory synkinesis for 10 seconds. Then, keeping the head still, they relax, wait two seconds, and then turn slowly further towards the barrier as the muscle relaxes. They continue to turn towards the barrier for 20 seconds gradually increasing the range of movement. Then, from the new barrier, the process is repeated twice. A printed sheet describing the exercise and including an illustration is given to the patient, instructing them to perform this exercise four times daily until seen again.

Results

One subject was lost to follow up. Six subjects (22%) relapsed following initial improvement. Five of these had dysfunctional segments in the mid cervical spine and one had a problem at the cervico-thoracic junction. Nineteen (70%) reported improvement to 85-100 % of normal and reported needing no further intervention other than continuing

their home exercise program. The remaining one reported improvement of 75%.

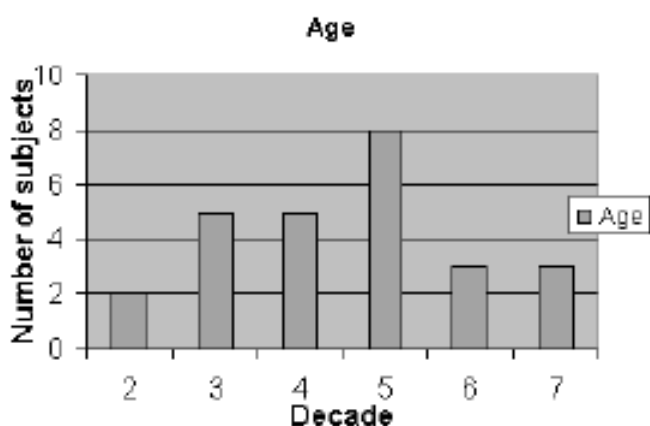
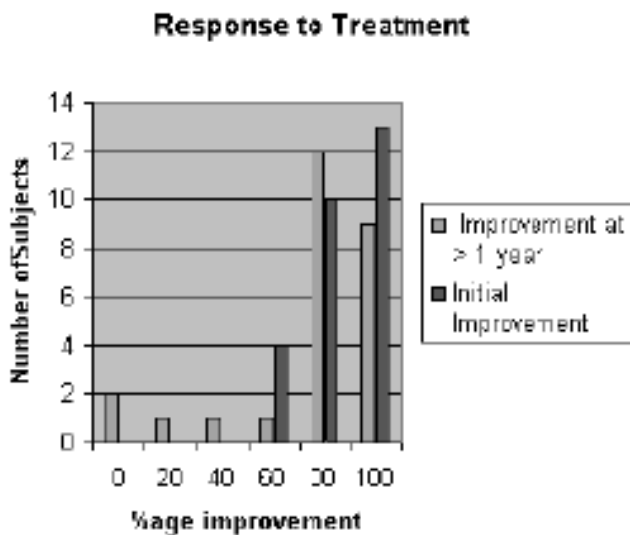
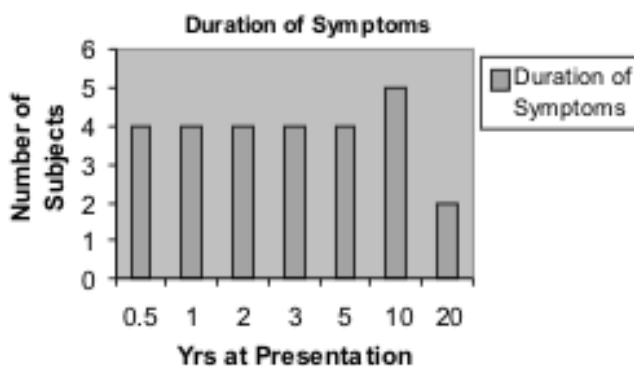
One of the upper three cervical segments was involved in 15 (58%) of the subjects in the study and 11 of these 15

(73% involving upper cervical segments) had a long-term improvement at one year. Multiple segments were involved in 16 subjects (62%).

Table 1.

Patient	Gender	Age	History	Segments	No. of Tx to settle	Objective at end of tx	Subjective (at 1 year)
1	M	25	1yr	C0-2 C7-T1	1	++++	++++ 85%
2	F	30	4 mth	C7-T1	1	++++	- Relapses
3	F	44	7 mth	C0-1	1	++++	++++ 85%
4	M	43	2 yr	C0-2 C5R, C6L	3	++++	+ Relapsed
5	M	63	3 yr	C0-2 C5R, C6L	2	++++	+++++ 87%
6	M	44	1yr		2	+++	++++ 85%
7	F	49	9 mth	C4-5	2	+++++	+++++ 100%
8	F	33	7 yr	C0-2	2	+++++	+++++ 100%
9	F	59	18 yr	C7-T1	2	+++++	+++++ 90%
10	F	31	10 yr	C0-3 C6-T1	2	++++	+ Relapsed
11	M	33	2 mth	C7-T1	1	++++	+++++ 100%
12	F	29	5 yr	C2 C5	2	+++++	++ Relapsed
13	F	53	9 mth	C7-T1	1	+++++	+++++ 99%
14	M	14	2 yr	C2 C6	2	+++++	+++++ 100%
15	F	48	2 yr	C7-T1	2	+++	++++ 85%
16	F	41	3 yr	C0-2	2	++++	++++ 90%
17	F	25	2.5 mth	C0-1 C3,4,7	4	++++	++++ Relapses
18	M	29	4 yr	C0-2	2	+++++	+++++ 100%
19	F	30	1 yr	C5 T1	2	+++++	+++++ 90%
20	F	65	6 mth	C7-T3	3	+++	++++ 85%
21	M	52	1 yr	C0-2 C6	2	+++++	+++ Relapsed
22	F		6 yr	C0-2	1	+++++	Lost

Patient	Gender	Age	History	Segments	No. of Tx to settle	Objective at end of tx	Subjective (at 1 year)
23	M	13	3 yr	C0-3	1	++++	+++++ 100%
24	M	43	1 yr	C5-6 x-r degen	13	+++	+++ 75%
25	F	27	5 yr	C0-2 C4-6	6	+++++	++++ 85%
26	F	45	8 yr	C0-2 C7-T1	1	+++++	+++++ 100%
27	M	60	4 mth	T1	2	+++++	+++++ 100%



Discussion

This study suggests that a particular method of treatment (SSPIR) can be used to treat effectively a high proportion of cases of long-standing neck pain.

The reason for the apparent success of the treatment used in this study has to be explained as it differs from other reports in the literature.

There is evidence, for both whiplash-associated disorders and other neck pain without radicular symptoms, that interventions which focus on regaining function as soon as possible are relatively more effective than interventions that do not have such a focus.⁹ There is no such evidence for chronic neck pain, however. This study was done to assess long-term outcomes of patients with long-standing neck pain after reports by earlier patients that they had been "cured". There are a number of areas of potential bias in both design and assessment which need to be addressed in a future study.

There was no control group.

Follow up data were collected by the practice nurse by phone. She had met and established rapport with the subjects who may have been unduly positive in their follow-up assessment.

However, the treatment was reported very positively, with improvement to at least 85% of normal in 19 of 27 patients (70%) with chronic neck pain. There is little if any evidence in the literature for improvement in this group of "chronic" patients. All subjects had tried at least one other physical therapist (chiropractor, osteopath, or physiotherapist) prior to entry to the study. One had had a problem for eight weeks. All others had had a problem for longer than three months and were thus classified as chronic. Nineteen had had a problem for over a year.

The method used is quite specific for the level treated, and allows localization and fixation of the lower cervical segment while generally using a short upper column (column A).

The resistance to movement of the two segments occiput (C0)-C1-C2 is substantial when dysfunctional. It appears that these segments require a longer period of holding at the barrier than do lower segments to effect mobilization. Patients frequently report significant discomfort during the procedure.

Headache was the predominant motivation to continue seeking relief. The upper cervical spine is a recognized source of cervical headache.

Cervical spine dysfunction results in a range of symptoms including headache and neck pain radiating to the shoulder and upper back. The distribution of the pain gives an indication of the level and has been mapped to show the characteristic areas of referral.^{10,11}

One neuroanatomical explanation for cervical headache is that afferent fibres from the upper three cervical spinal nerves and the trigeminal nerve converge on common neurones in the brain stem and upper spinal cord.¹² Thus, nociceptive impulses arising from the upper segments may be misinterpreted as arising from areas innervated by the trigeminal nerve and thus perceived as headache.

Evidence for headache arising from the zygapophysial joints was produced by Bogduk et al¹³ who described a technique for blocking the third occipital nerve which resulted in relief of headache in seven of ten subjects. The structures innervated by the third occipital nerve are skin, part of the semispinalis capitis muscle and the C2-3 zygapophysial joint. There are no known conditions affecting only that part of semispinalis capitis innervated by C3, and no occult conditions of the skin. Thus, the C2-3 zygapophysial joint was left as the only possible source of the headache in these subjects. It has long been known that noxious stimulation of muscles and ligaments innervated by the dorsal rami of the upper three cervical roots can produce headache in normal volunteers.¹⁴⁻¹⁶

The issue of accuracy of clinical diagnosis by manual techniques has long been contentious. One study¹⁷ has shown a very high degree of corroboration between the manual therapist's diagnosis and medical confirmation using diagnostic blocks. However, a subsequent study by King¹⁸ refuted this.

There is also evidence that musculoskeletal symptoms are inadequately assessed or ignored. In a study of 166 patients admitted to general medical wards, Ahern et al. found that 54.8% had musculoskeletal symptoms, with 17.5% having a significant rheumatologic disorder that had been ignored. Musculoskeletal symptoms were recorded in 40.4% but musculoskeletal examination was performed in only 14.5%.¹⁹

The apparent effectiveness of this treatment needs further investigation using a carefully designed trial with specific entry criteria, control treatment groups, and an independent observer to assess the effectiveness of the treatment. The present study establishes that one can expect a success rate (>85% relief) at 12 months of 70%. Such data are crucial to the design of a controlled trial, for they determine the size of the study that should follow. Assuming a placebo rate at one year of 20% and an expected success of 60%, gives a relative risk of 3. Using these figures, a controlled trial with a power of 80% and an alpha value of 5% should involve at least 20 patients in each group.

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Journal abstracts

This section aims to update the reader with some of the more significant musculoskeletal research published in the last year which is listed on the Medline and CINAHL databases.

SPINE

Khan SA, Kumar A, Varshney MK et al. Dextrose prolotherapy for recalcitrant coccygodynia. *J Orthop Surg (Hong Kong)* 2008;16(1):27-29. Comment in: *J Orthop Surg (Hong Kong)* 2008;16(2): 270; author reply 270. Department of Orthopaedics, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India. shahalamkhan@rediffmail.com

Purpose. To present the results of dextrose prolotherapy undertaken for chronic non-responding coccygodynia in 37 patients.

Methods. 14 men and 23 women (mean age, 36 years) with chronic coccygodynia not responding to conservative treatment for more than 6 months were included. 27 of them had received local steroid injections. A visual analogue score (VAS) was recorded for all patients before and after injection of 8 ml of 25% dextrose and 2 ml of 2% lignocaine into the coccyx. In 8 patients with a VAS of more than 4 after the second injection, a third injection was given 4 weeks later.

Results. The mean VAS before prolotherapy was 8.5. It was 3.4 after the first injection and 2.5 after the second injection. Minimal or no improvement was noted in 7 patients; the remaining 30 patients had good pain relief.

Conclusion. Dextrose prolotherapy is an effective treatment option in patients with chronic, recalcitrant coccygodynia and should be used before undergoing coccygectomy. Randomised studies are needed to compare prolotherapy with local steroid injections or coccygectomies.

PMID: 18453654 [PubMed - indexed for MEDLINE]

Comment: This is the paper referred to in David Vivian's paper on coccygeal pain. It documents some impressive results and the authors suggest it is a useful intervention for patients with chronic recalcitrant coccygeal pain, and should be trialled before anyone is referred for coccygectomy. Further study with randomized controlled trials certainly seem warranted. This paper is available free of charge through the Links area of the PubMed abstract at <http://www.ncbi.nlm.nih.gov/sites/entrez> or just Google "PubMed" and then search PubMed for the authors to get the abstract. Also at <http://www.josonline.org/abstracts/v16n1/27.html> and then download the pdf version, or more directly at <http://www.josonline.org/pdf/v16i1p27.pdf> – Dr David Roselt

Ma B, Wu H, Jia LS et al. Cauda equina syndrome: a review of clinical progress. *Chin Med J (Engl)* 2009;122(10):1214-22. Division of Orthopedics, Orthopedics Institute of PLA, Changzheng Hospital, Second Military Medical University, Shanghai, China.

Objective. To review the literature on the clinical progress

in cauda equina syndrome (CES), including the epidemic history, pathogenesis, diagnosis, treatment policy and prognosis.

Data sources. All reports on CES in the literature were searched in PubMed, Ovid, Springer, Elsevier, and the Chinese Biomedical Literature Disk using the key terms "cauda equina syndrome", "diagnosis", "treatment", "prognosis" and "evidence-based medicine".

Study selection. Original milestone articles and critical reviews written by major pioneer investigators about the cauda equina syndrome were selected.

Results. CES is rare, both atraumatically and traumatically. Males and females are equally affected. The incidence of CES is variable, depending on the etiology of the syndrome. The most common cause of CES is herniation of a lumbar intervertebral disc. CES symptoms may have sudden onset and evolve rapidly or sometimes chronically. Each type of CES has different typical signs and symptoms. Low back pain may be the most significant symptom, accompanied by sciatica, lower extremities weakness, saddle or perianal hypoesthesia, sexual impotence, and sphincter dysfunction. MRI is usually the preferred investigation approach. Patients who have had CES are difficult to return to a normal status.

Conclusions. The diagnosis of CES is primarily based on a careful history inquiry and clinical examination, assisted by elective radiologic investigations. Early diagnosis and early surgical decompression are crucial for a favorable outcome in most CES cases.

PMID: 19493474 [PubMed - in process]

Related articles

Gitelman A, Hishmeh S, Morelli BN, Joseph SA Jr et al. Cauda equina syndrome: a comprehensive review. *Am J Orthop* 2008; 37(11):556-62.

McCarthy MJ, Aylott CE, Grevitt MP, Hegarty J. Cauda equina syndrome: factors affecting long-term functional and sphincteric outcome. *Spine* 2007;32(2):207-16.

Bell DA, Collie D, Statham PF. Cauda equina syndrome: what is the correlation between clinical assessment and MRI scanning? *Br J Neurosurg* 2007;21(2):201-3.

Comment: This is a useful overview of an uncommon but very important red flag condition. It is primarily a clinical diagnosis confirmed by imaging, ideally MRI. It is traditionally considered a surgical emergency, though the urgency with which surgery should be performed is somewhat contentious as highlighted in this and the related articles, abstracts of which I shall also include on this important topic that we have not recently explored. Early diagnosis and early surgical decompression are still crucial for a favorable outcome in most CES cases.

The full text article is available through a link on the PubMed abstract page, or through http://www.cmj.org/Periodical/paperlist.asp?id=LW2009519546603608691&linkin_type=pubmed – Dr David Roselt

Gitelman A, Hishmeh S, Morelli BN et al. Cauda equina syndrome: a comprehensive review. *Am J Orthop* 2008; 37(11):556-62. Department of Orthopaedic Surgery, Stony Brook University Medical Center, Stony Brook, New York, USA.

Cauda equina syndrome (CES) is a rare syndrome that has been described as a complex of symptoms and signs – low back pain, unilateral or bilateral sciatica, motor weakness of lower extremities, sensory disturbance in saddle area, and loss of visceral function – resulting from compression of the cauda equina. CES occurs in approximately 2% of cases of herniated lumbar discs and is one of the few spinal surgical emergencies. In this article, we review information that is critical in understanding, diagnosing, and treating CES.

PMID: 19104682 [PubMed - indexed for MEDLINE]

Comment: This is another recent review for the interested reader from the US published in the American Journal of Orthopedics which gives us a prevalence guide and emphasizes the emergency nature of this presentation. It highlights that the diagnosis is clinical based on history and examination, confirmed on imaging such as MRI. – Dr David Roselt

Qureshi A, Sell P. Cauda equina syndrome treated by surgical decompression: the influence of timing on surgical outcome. *Eur Spine J* 2007;16(12):2143-51. Epub 2007 Sep 9. Department of Orthopaedics, University Hospitals of Leicester, Leicester General Hospital, Gwendolen Road, Leicester, LE5 4PW, UK.

A prospective longitudinal inception cohort study of 33 patients undergoing surgery for cauda equina syndrome (CES) due to a herniated lumbar disc. To determine what factors influence spine and urinary outcome measures at 3 months and 1 year in CES specifically with regard to the timing of onset of symptoms and the timing of surgical decompression. CES consists of signs and symptoms caused by compression of lumbar and sacral nerve roots. Controversy exists regarding the relative importance of timing of surgery as a prognostic factor influencing outcome. Post-operative outcome was assessed at 3 months and 1 year using the Oswestry Disability Index (ODI), Visual Analogue Scale (VAS) scores for leg and back pain and an incontinence questionnaire. Statistical analysis was used to determine the association between pre-operative variables and these post-operative outcomes with a specific emphasis on the timing of surgery. Surgery was performed on 12 (36%) patients within 48 h of the onset of symptoms including seven patients (21%) who underwent surgery within 24 h. Follow up was achieved in 27 (82%) and 25 (76%) patients

at 3 and 12 months, respectively. There was no statistically significant difference in outcome between three groups of patients with respect to length of time from symptom onset to surgery – <24, 24-48 and >48 h. A significantly better outcome was found in patients who were continent of urine at presentation compared with those who were incontinent. The duration of symptoms prior to surgery does not appear to influence the outcome. This finding has significant implications for the medico-legal sequelae of this condition. The data suggests that the severity of bladder dysfunction at the time of surgery is the dominant factor in recovery of bladder function.

PMID: 17828560 [PubMed - indexed for MEDLINE] PMID: PMC2140120

Comment: This important prospective longitudinal inception cohort study of 33 patients undergoing surgery for cauda equina syndrome (CES) due to a herniated lumbar disc highlights the controversy regarding the importance of timing of surgery as a prognostic factor for surgical outcome. The duration of symptoms prior to surgery did not appear to influence the outcome. However, at this stage, it should still be regarded as a surgical emergency and urgent consultation still sought. The authors emphasized that this finding does have significant implications for the medico-legal sequelae of this condition. As they state, the data suggest that the severity of bladder dysfunction at the time of surgery is the dominant factor in recovery of bladder function. The full paper is available through a link on the abstract page at PubMed or at <http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=17828560>. – Dr David Roselt

Bell DA, Collie D, Statham PF. Cauda equina syndrome: what is the correlation between clinical assessment and MRI scanning? *Br J Neurosurg* 2007;21(2):201-3. Department of Neurosurgery, St George's Hospital, London, UK. davidalexanderbell@hotmail.com

The indications for magnetic resonance imaging (MRI) in suspected cauda equina syndrome, and the urgency for this investigation are regularly disputed. In this study we assess the ability of neurosurgical residents to predict on clinical grounds in which patients with cauda equina syndrome (CES) this was due to prolapsed intervertebral disc thereby justifying a request for urgent MR imaging.

Design. Prospective cohort study of all adult patients with a suspected diagnosis of cauda equina syndrome.

Setting. A single tertiary referral neurosurgical centre.

Participants. All patients referred over a four month period with a suspected diagnosis of cauda equina syndrome.

Results. MRI was normal in 10 (43%) patients. A disc prolapse causing cauda equina distortion was present in 5 (22%) patients. The diagnostic accuracy of urinary retention, urinary frequency, urinary incontinence, altered urinary sensation and altered perineal sensation were 0.57, 0.65, 0.61, 0.65 and 0.60 respectively.

Conclusions. Because it is impossible in a significant proportion of patients to exclude the diagnosis of prolapsed intervertebral disc in the context of referral with suspected cauda equina compromise the authors recommend urgent MRI assessment in all patients who present with new onset urinary symptoms in the context of lumbar back pain or sciatica.

PMID: 17453789 [PubMed - indexed for MEDLINE]

Comment: The indications for MRI in suspected CES and the urgency for this investigation and subsequent surgical intervention are controversial. Traditional teaching was that CES is a surgical emergency requiring evaluation and surgery as early as possible, such as within six hours, but this is rarely achievable in the UK or in regional Australia for that matter. There may be delays in patient presentation, clinical diagnosis, referral for MRI, its performance, and then surgical intervention. The authors recommend urgent MRI assessment in all patients who present with new onset urinary symptoms in the context of lumbar back pain or sciatica. – *Dr David Roselt*

McCarthy MJ, Aylott CE, Grevitt MP, Hegarty J. Cauda equina syndrome: factors affecting long-term functional and sphincteric outcome. *Spine* 2007;32(2):207-16. Department of Spinal Studies and Surgery, Queens Medical Centre, Nottingham, United Kingdom.

Study design. Retrospective cohort study with prospective clinical follow-up.

Objective. To determine the factors that influence outcome after surgery for cauda equina syndrome (CES).

Summary of background data. CES is a rare but serious consequence of lumbar disc prolapse and can have devastating long-lasting neurologic consequences. The timing of surgical decompression remains controversial.

Methods. Fifty-six patients with evidence of a sphincteric disturbance who underwent urgent surgery were identified and invited to follow-up. The outcome measures comprised history and examination and several validated self-assessment questionnaires.

Results. Forty-two patients (78%) attended with a mean follow-up of 60 months (range, 25-114 months). Mean age at onset was 41 years (range, 24-67 years) with 23 males and 19 females. Twenty-six patients were operated on within 48 hours of onset of sphincteric symptoms; 5 of these were within 24 hours. Acute onset of sphincteric symptoms and the time to operation did not influence the outcomes. Leg weakness at onset persisted in a significant number of patients at follow-up ($P < 0.005$). Urinary disturbance at presentation did not affect the outcomes. At follow-up, significantly more females had urinary incontinence ($P < 0.005$). Bowel dysfunction at presentation was associated with sexual problems at follow-up ($P < 0.005$). The 13 patients who failed their post operative trial without catheter had worse outcomes. The SF-36 scores at follow-up were reduced compared with age-matched controls in the popula-

tion. The mean ODI was 29, Low Back Outcome Score 42, and VAS 4.5. The time elapsed from operation to follow-up was not found to influence the outcomes.

Conclusions. In our series, the symptom duration before operation and the speed of onset do not affect the outcome more than 2 years after surgery. Based on the SF-36, ODI, and Low Back Outcome Scores, patients who have had CES do not return to a normal status.

PMID: 17224816 [PubMed - indexed for MEDLINE]

Comment: This retrospective cohort study from Nottingham, UK, is consistent with the subsequent prospective study by Qureshi and Sell.¹

It seems to suggest that outcomes are more related to pathology present at onset. Early surgery does not necessarily achieve a good outcome. Time to operation did not seem to affect surgical outcomes. The outlook is guarded in this serious spinal condition, and many do not return to full recovery in spite of early treatment.

1. Qureshi A, Sell P. Cauda equina syndrome treated by surgical decompression: the influence of timing on surgical outcome. *Eur Spine J* 2007;16(12):2143-51. Epub 2007 Sep 9.

– *Dr David Roselt*

Skljarevski V, Ossanna M, Liu-Seifert H et al. A double-blind, randomized trial of duloxetine versus placebo in the management of chronic low back pain. *Eur J Neurol* 2009 May 12. [Epub ahead of print] Lilly Research Laboratories, Indianapolis, IN, USA.

Background. Duloxetine has demonstrated analgesic effect in chronic pain states. This study assesses the efficacy of duloxetine in chronic low back pain (CLBP).

Methods. Adult patients with non-radicular CLBP entered this 13-week, double-blind, randomized study comparing duloxetine 20, 60 or 120 mg once daily with placebo. The primary measure was comparison of duloxetine 60 mg with placebo on weekly mean 24-h average pain. Secondary measures included Roland-Morris Disability Questionnaire (RMDQ-24), Patient's Global Impressions of Improvement (PGI-I), Brief Pain Inventory (BPI), safety and tolerability.

Results. Four hundred four patients were enrolled, 267 completed. No significant differences existed between any dose of duloxetine and placebo on reduction in weekly mean 24-h average pain at end-point. Duloxetine 60 mg was superior to placebo from weeks 3-11 in relieving pain, but not at weeks 12-13. Duloxetine 60 mg demonstrated significant improvement on PGI-I, RMDQ-24, BPI-average pain and BPI-average interference. Significantly more patients taking duloxetine 120 mg (24.1%) discontinued because of adverse events, versus placebo (8.5%). **Conclusions:** Duloxetine was superior to placebo on the primary objective from weeks 3-11, but superiority was not maintained at end-point. Duloxetine was superior to placebo on many secondary measures, and was well-tolerated.

Comment: Duloxetine was not superior to placebo at end point at 13 weeks for weekly mean 24-hour average pain, but was from weeks 3-11. It improved Patient's Global Impressions of Improvement, Roland-Morris Disability Questionnaire which measures disability, and Brief Pain Inventory average pain and average interference, so it was superior to placebo on many secondary measures, and was well-tolerated at the 60 mg dose and safe. It may be a good choice for patients with low back pain and depression. – *Dr David Roselt*

Frih ZB, Fendri Y, Jellad A et al. Efficacy and treatment compliance of a home-based rehabilitation programme for chronic low back pain: A randomized, controlled study. *Ann Phys Rehabil Med* 2009 May 15. [Epub ahead of print] Department of Physical Medicine and Rehabilitation, hôpital F. Bourguiba, université de Monastir, 5000 Monastir, Tunisia.

Objective. To assess the efficacy and treatment compliance of a home-based rehabilitation programme for chronic low back pain (CLBP).

Population. CLBP outpatients treated in a Physical Medicine Rehabilitation or Rheumatology unit within a university hospital.

Methods. We performed a prospective, comparative study. The participants were randomly assigned to either a home-based rehabilitation programme (Gp A) or a standard physical therapy (Gp B). The programme included four weekly sessions. In each group, we measured pain intensity (on a visual analogue scale, VAS), flexibility and muscle endurance (the Schöber MacRae test, finger-to-floor distance, thigh-leg angle, the Shirado and Sorensen test), functional and psychological repercussions (the Quebec functional index and the Hospital Anxiety and Depression scale) and handicap (on a VAS). Follow-up examinations took place at baseline and four weeks and three, six and 12 months later.

Results. One hundred and seven patients (82 women) with a mean \pm standard deviation (S.D.) age of 35.7 \pm 0.8 years were included (with 54 patients in Gp A). At four weeks, a significant improvement (relative to baseline) was observed for all parameters in both study groups but with a significantly greater difference in Gp A, which was maintained at one year (despite an observed regression of the improvement at six months). At one year, compliance with the home-based rehabilitation programme was good (68.1%) and 59.5% of the patients regarded the programme as useful.

Conclusion. Our results suggest that a home-based rehabilitation programme is as effective as standard physical therapy. However, this type of programme requires patient motivation and regular follow-up.

Comment: At four weeks, a significant improvement (relative to baseline) was observed for all parameters in both study groups but with a significantly greater difference in Gp A, the home-based rehabilitation program, which was

maintained at one year (despite an observed regression of the improvement at six months). This suggests that a home-based rehabilitation program is more effective than a standard physical therapy. The authors state that this type of program requires patient motivation and regular follow-up, but no more than for the standard program after the four-week intervention.

In the home-based rehabilitation program, patients were assigned to groups of six subjects and received four training sessions of supervised exercises weekly with two-hour sessions led by the same physiotherapist as an outpatient service. Initially, the program included 18 exercises: four self-positioning exercises for pain management (two in extension and two in flexion), eight muscle stretching exercises (lumbar spine, quadriceps, psoas and hip adductors) and four other muscle-strengthening exercises (abdominal and trunk muscles). The exercises were learnt during the first three sessions (that is, six per session).

The patients were asked to perform these exercises daily at home, with a booklet given to each patient with illustrations of each exercise. The fourth session included a review of the previous lessons and the establishment of the final home-based program, consisting of nine exercises for each patient (to be performed for 30 minutes a day for a month).

The standard rehabilitation program lasted four weeks and involved 90 minutes of treatment a day, three times a week. The program included analgesic electrotherapy, flexibility training, pain management, stretching and proprioception exercises and muscle strengthening exercises. All patients received an individual session by the same physiotherapist.

This may be more complicated than strictly necessary but the home exercise program would be more cost effective as well as efficacious, and could surely be simplified considerably for home use. – *Dr David Roselt*

Sayegh FE, Kenanidis EI, Papavasiliou KA et al. Efficacy of steroid and nonsteroid caudal epidural injections for low back pain and sciatica: a prospective, randomized, double-blind clinical trial. *Spine* 2009; 34(14):1441-47 (ISSN: 1528-59) 3rd Orthopaedic Department, Aristotle University of Thessaloniki-Medical School, Papageorgiou General Hospital, Thessaloniki, Greece.

Study design. Prospective, double-blind, randomized, case-control study.

Objective. To evaluate the efficacy of caudal epidural injections (CEI) containing steroid versus nonsteroid preparations when treating patients suffering from low back pain (LBP) and sciatica.

Summary of background data. Literature seems to be deprived of well-designed randomized, controlled studies that evaluate the effectiveness of CEI in the treatment of chronic LBP; hence the value of CEI remains still the subject of controversy.

Methods. Patients suffering from severe chronic LBP and sciatica were randomly allocated into 2 groups. Steroid-

group's patients (n = 93) underwent CEI containing 12 mL of xylocaine 2% and 1 mL of betamethasone dipropionate and betamethasone phosphate (2 + 5) mg/dL. Water for Injection (WFI)-group's patients (n = 90) underwent CEI containing 12 mL of xylocaine 2% and 8 mL of WFI. Both groups were statistically comparable as far as their demographic data and the cause and duration of symptoms were concerned. Patients answered the Oswestry Disability Index questionnaire and underwent physical examination, before and at 1 week, 1 month, 6 months, and 1 year following the CEI.

Results. Symptoms improved in 132 patients (72.1%) following CEI. The mean Oswestry Disability Index questionnaire score of steroid-group's patients was statistically significant lower than that of the WFI-group at all postinjection re-evaluations. Patients receiving steroid CEI experienced faster relief during the first postinjection week. The Straight Leg Rising test improved in both groups following CEI; this improvement was faster among steroid-group's patients. Fifty-one patients (27.8%), noticed no improvement 1 week post-CEI and underwent a second CEI (with the same preparation) 7 to 14 days later. Nineteen of them reported improvement; 32 (steroid-group:13, WFI-group:19) did not respond well and underwent operative decompression (n = 15) or spinal fusion (n = 17).

Conclusion. CEI containing local anesthetic and steroids or WFI seems to be effective when treating patients with LBP and sciatica. CEI containing steroid preparations demonstrated better and faster efficacy.

PreMedline Identifier:19525834

From MEDLINE®/PubMed®, a database of the U.S. National Library of Medicine.

Comment: This prospective, double-blind, randomized, case-control study from Thessalonika, Greece, showed benefit in 72.1% of this perhaps mixed group of patients with chronic LBP and sciatica. There were improvements in pain and disability on the Oswestry Disability Index questionnaire, with faster relief seen with the steroid CEI group utilizing betamethasone dipropionate and betamethasone phosphate. Some patients needed a second CEI (with the same preparation) after 7-14 days to obtain improvement in the absence of apparent effect initially. Follow-up was for one year. The authors demonstrated that CEI containing steroid demonstrated better and faster efficacy than the control group in this study. It is possible that similar results can be obtained using much less lignocaine, with reports of good results with 8 ml of 0.5% lignocaine and 1-2 ml of steroid, such as dexamethasone 4 mg/ml. This mixture is a lot safer in the event of an intravascular injection which can occur in up to 10% of CEIs. – *Dr David Roselt*

Briggs AM, Buchbinder R. Back pain: a National Health Priority Area in Australia? Med J Aust 2009 May 4;190(9):499-502. School of Physiotherapy, Curtin University of Technology, Perth, WA, Australia.

The aim of the National Health Priority Area (NHPA) ini-

tiative is to promote cooperation between government and non-government organisations to monitor, report on and develop strategies to improve health outcomes for Australians. The seven existing NHPAs (cancer control, injury prevention and control, cardiovascular health, mental health, diabetes mellitus, asthma and musculoskeletal conditions) were selected on the basis of their profound burden on the health of Australians. Up to eighty per cent of Australians will experience back pain at some point in their lives and 10% will experience significant disability as a result. Back pain disrupts individuals' quality of life and accounts for an enormous cost to the community. Integrating back pain into the NHPA framework has many potential benefits, including more systematic development and implementation of programs aimed at minimising back pain-related disability by providing a focus for policy, legislation and public awareness; and promotion of best-practice management of the condition. A disadvantage of making back pain an NHPA is the risk that back pain management could become further medicalised and ineffective interventions could become more accepted. Coordinated action on back pain is needed, and integrating back pain into the NHPA framework is one solution. Informed decision making through consultation with key stakeholders is a necessary first step towards ensuring that favourable outcomes are achieved.

PMID: 19413521 [PubMed - indexed for MEDLINE]

Comment: This discussion paper for debate from the School of Physiotherapy, Curtin University of Technology, Perth, highlights that there are seven existing National Health Priority Areas (NHPAs) including musculoskeletal conditions. It states that "up to eighty per cent of Australians will experience back pain at some point in their lives and 10% will experience significant disability as a result, and that back pain disrupts individuals' quality of life and accounts for an enormous cost to the community." The authors want to give back pain separate recognition. As stated above, the authors are concerned, however, that there is "disadvantage in making back pain an NHPA as there is a risk that back pain management could become further medicalized and ineffective interventions could become more accepted." It is not as though physiotherapy has the answer¹ and neither has multidisciplinary pain management.^{1,2}

"On the other hand, making back pain an NHPA has the potential to paradoxically *increase* the burden of back pain by inadvertently increasing the focus on the problem itself and providing justification for those with (or without) vested interests to promote clinically ineffective interventions. This is of some concern as we have recently observed that a self-reported special interest in back pain among Australian general practitioners is strongly associated with back pain management beliefs and practices that are contrary to the best available evidence."³

In this paper, AAMM is singled out for special mention.

"Back pain is the most common musculoskeletal reason for visiting the general practitioner. Those who seek care usually have more disabling LBP and fear that the pain could impair life or capacity for work, both risk factors for chronicity. It is

therefore imperative that general practitioners have a high level of expertise in managing this problem. Our data suggest that those who seek medical care, particularly those who have more severe symptoms or concerns, may be more likely to seek care from a general practitioner who claims special expertise or interest in back pain. This is supported by the findings of a recent Australian survey of different primary care clinicians treating back pain which found that there was a higher caseload of LBP patients among a random sample of physicians identified from the membership list of the Australian Association of Musculoskeletal Medicine than among a random sample of physicians identified from the Royal Australian College of General Practitioners (RACGP). Yet our study suggests, contrary to what might be expected, that this may not be in the patient's best interests."

"Responses were received from 3831 general practitioners (overall response rate [RR]: 38.2%). Physicians with a special interest in LBP were more likely to believe that complete bed rest and avoidance of work is appropriate for acute low back pain (RR: 1.89 [95% CI: 1.53–2.33] and 1.55 [95% CI: 1.31–1.83], respectively) and lumbar spine radiographs are useful (RR: 1.36 [95% CI: 1.21–1.51]). The disparity between those with and without a special interest in LBP was still evident after adjusting for the presence of other special interests and recent CME. After adjusting for the presence of other special interests and recent CME, there were no important differences in back pain beliefs between those with and without a special interest in musculoskeletal medicine, while those with a special interest in occupational medicine and those who had received recent CME had better beliefs." See below for the abstract from *Spine* in full with further comment.

Apparently a special interest in musculoskeletal medicine did not lead to important differences in low back pain beliefs, so it must be other doctors with a special interest in low back pain per se that are the problem. Why then a specific mention for AAMM? And all of this is based on questionnaires from 1997, 2000, and 2004. This whole discussion paper from the *MJA* is available via a PubMed link or http://www.mja.com.au/public/issues/190_09_040509/bri11124_fm.html though you may have to be an AMA member and register with the eMJA website to access the full paper for free.

1. Bogduk N. Management of chronic low back pain. *MJA* 2004; 180 (2): 79-83.

2. Bogduk N, McGuirk B. *Medical Management of Acute and Chronic Low Back Pain. An Evidence-Based Approach*. Amsterdam; Elsevier, 2002.

3. Buchbinder R, Staples MP, Jolley DJ. Doctors with a special interest in back pain have poorer knowledge about how to treat back pain. *Spine* 2009; 34: 1218-26.

– Dr David Roselt

Buchbinder R, Staples M, Jolley D. Doctors with a special interest in back pain have poorer knowledge about

how to treat back pain. *Spine* (Phila Pa 1976). 2009 May 15;34(11):1218-26; discussion 1227. Department of Clinical Epidemiology, Cabrini Hospital, Melbourne, Australia. rachelle.buchbinder@med.monash.edu.au

Study design. We conducted an observational study using mailed questionnaires to 3 random samples of general practitioners from Victoria and New South Wales, Australia in 1997, 2000, and 2004. **OBJECTIVE:** To determine whether general practitioners' beliefs about low back pain (LBP) differ according to whether they have a special interest in back pain, musculoskeletal, or occupational medicine; and whether these beliefs are modified by having had continuing medical education (CME) about back pain in the previous 2 years.

Summary of background data. Physician surveys continue to demonstrate that general practitioners only partially manage LBP in an evidence-based way. Identified barriers to changing physician behavior, in regard to management of back pain, have included patient factors such as their past back pain experiences and preferences for care as well as physician beliefs about the association of pain and activity; although the influence of physician special interests has not been studied. **METHODS:** Back pain beliefs of different subsets (special interests vs. no special interests and CME vs. no CME) were compared using relative risks (RRs) adjusted for state and survey. The analysis was then repeated including all special interests and recent back pain CME in the model.

Results. Responses were received from 3831 general practitioners (overall response rate [RR]: 38.2%). Physicians with a special interest in LBP were more likely to believe that complete bed rest and avoidance of work is appropriate for acute low back pain (RR: 1.89 [95% CI: 1.53-2.33] and 1.55 [95% CI: 1.31-1.83], respectively) and lumbar spine radiographs are useful (RR: 1.36 [95% CI: 1.21-1.51]). The disparity between those with and without a special interest in LBP was still evident after adjusting for the presence of other special interests and recent CME. After adjusting for the presence of other special interests and recent CME, there were no important differences in back pain beliefs between those with and without a special interest in musculoskeletal medicine, while those with a special interest in occupational medicine and those who had received recent CME had better beliefs.

Conclusion. A special interest in back pain is associated with back pain management beliefs contrary to the best available evidence. This has serious implications for management of back pain in the community.

PMID: 19407674 [PubMed - in process]

Comment: As mentioned above, this paper referenced in a recent discussion paper in the *MJA*¹ purports to show that a special interest in back pain is associated with back pain management beliefs contrary to the best available evidence. "Physicians with a special interest in LBP were more likely to believe that complete bed rest and avoidance of work is appropriate for acute low back pain (RR: 1.89 [95% CI: 1.53-2.33] and 1.55 [95% CI: 1.31-1.83], respectively) and

lumbar spine radiographs are useful (RR: 1.36 [95% CI: 1.21-1.51]). The disparity between those with and without a special interest in LBP was still evident after adjusting for the presence of other special interests and recent CME. However, after adjusting for the presence of other special interests and recent CME, there were no important differences in back pain beliefs between those with and without a special interest in musculoskeletal medicine." This seems contradictory and based on questionnaires dating from 1997, 2000, and 2004. This is of limited relevance to the present if ever, as these statements are contrary to AAMM teaching at our annual scientific conferences as far back as at least 1997 based on the evidence from papers such as Indahl et al published in *Spine* in the mid to late 1990s,^{2, 3} and as crystallized in the Australian National Musculoskeletal Medicine Initiative in 2000 and 2001,⁴ a publication by Bogduk and McGuirk in 2002,⁵ the subsequent NHMRC publications in 2003,^{6, 7} and the *MJA* in 2004.⁸

1. Briggs AM, Buchbinder R. Back pain: a National Health Priority Area in Australia? *Med J Aust* 2009 May 4;190(9):499-502.

2. Indahl A, Velund L, Reikeraas O. Good prognosis for low back pain when left untampered. A randomized clinical trial. *Spine* (Phila Pa 1976). 1995; 20: 473-77.

3. Indahl A, Haldorsen EH, Holm S et al. Five-year follow-up study of a controlled clinical trial using light mobilization and an informative approach to low back pain. *Spine* (Phila Pa 1976). 1998; 23: 2625-30.

4. McGuirk B, King W, Govind J et al. Safety, efficacy, and cost-effectiveness of evidence-based guidelines for the management of acute low back pain in primary care. *Spine* 2001; 26:2615-22.

5. Bogduk N, McGuirk B. *Medical Management of Acute and Chronic Low Back Pain. An Evidence-Based Approach*. Amsterdam; Elsevier, 2002.

6. Evidence-based Management of Acute Musculoskeletal Pain. CP94. 2003. NHMRC. http://www.nhmrc.gov.au/publications/synopses/_files/cp94.pdf

7. Evidence-based Management of Acute Musculoskeletal Pain – a guide for clinicians. CP95. 2003. NHMRC. http://www.nhmrc.gov.au/publications/synopses/_files/cp95.pdf

8. Bogduk N. Management of chronic low back pain. *MJA* 2004; 180 (2): 79-83.

– Dr David Roselt

Finestone AS, Raveh A, Mirovsky Y et al. Orthopaedists' and family practitioners' knowledge of simple low back pain management. *Spine* (Phila Pa 1976). 2009;34(15):1600-1603. Department of Orthopaedics, Assaf HaRofeh Medical Center, Zeriffin, Israel. asff@inter.net.il

Study design. Comparative knowledge survey.

Objective. This study compared the knowledge of orthopaedic surgeons and family practitioners in managing simple

low back pain (LBP) with reference to currently published guidelines.

Summary of background data. LBP is the most prevalent of musculoskeletal conditions. It affects nearly everyone at some point in time and about 4% to 33% of the population at any given point. Treatment guidelines for LBP should be based on evidence-based medicine and updated to improve patient management and outcome. Studies in various fields have assessed the impact of publishing guidelines on patient management, but little is known about the physicians' knowledge of the guidelines.

Methods. Orthopedic surgeons and family practitioners participating in their annual professional meetings were requested to answer a questionnaire regarding the management of simple low back pain. Answers were scored based on the national guidelines for management of low back pain.

Results. One hundred forty family practitioners and 253 orthopaedists responded to the questionnaire. The mean family practitioners' score (69.7) was significantly higher than the orthopaedists' score (44.3) ($P < 0.0001$). No relation was found between the results and physician demographic factors, including seniority. Most orthopaedists incorrectly responded that they would send their patients for radiologic evaluations. They would also preferentially prescribe cyclo-oxygenase-2-specific nonsteroidal anti-inflammatory drugs, despite the guidelines recommendations to use paracetamol or nonspecific nonsteroidal anti-inflammatory drugs. Significantly less importance was attributed to patient encouragement and reassurance by the orthopaedists as compared with family physicians.

Conclusion. Both orthopaedic surgeons' and family physicians' knowledge of treating LBP is deficient. Orthopedic surgeons are less aware of current treatment than family practitioners. Although the importance of publishing guidelines and keeping them up-to-date and relevant for different disciplines in different countries cannot be overstressed, disseminating the knowledge to clinicians is also very important to ensure good practice.

PMID: 19564770 [PubMed - in process]

Comment: Even the orthopedic surgeons are in trouble now, with knowledge of or adherence to guidelines on managing simple low back pain significantly worse than that of the humble family practitioner. This further casts doubt on the appropriateness of orthopedic referral in the absence of any red flag indicators or conditions. This parlous state may be related to the reliance by orthopedic surgeons on the biomedical model that is heavily based on imaging, despite evidence to the contrary re its value. Imaging does not show pain but usually shows only age-related changes in the absence of red flag indicators on history or examination. Is it any wonder that GPs still order imaging when there is tremendous pressure for this from the patients, reinforced by or in fact these days often demanded by allied health practitioners when they can't get the patient better in two weeks, who are trained and strongly influenced by orthopedic surgeons in the biomedical model. Are the humble GPs and

musculoskeletal medicine practitioners expected to be the only true lights when it comes to evidence-based practice? Who are the patients to believe when they are receiving conflicting information? Admittedly, if patients are over 50 years of age, they are at increased risk of osteoporotic compression fracture. In fact, in primary care, 4% of patients with back pain will have compression fractures, so we are not talking about a rare condition.¹ Age over 50 is in itself a red flag indicator, and thus an indication for ordering imaging, usually plain films. Perhaps that is what the orthopedic surgeons and the family practitioners are referring to in their responses. This risk increases even further over age 70, and also if there is a history of corticosteroid use, usually oral at moderate doses $> \text{or} =$ to 7.5 mg/day for three months. Also a history of trauma is a risk factor but it may be minor and most patients with osteoporotic compression fractures do not have a history of identifiable trauma (sensitivity 0.30).¹ It is important to diagnose in terms of prognosis and also for prevention, as treatment is required in the form of calcium, vitamin D, or other agents such as biphosphonates to help limit this epidemic of osteoporotic compression fracture. This older group aged over 50 years is usually excluded from these trials.² Interestingly, significantly less importance was attributed to patient encouragement and reassurance by the orthopedic surgeons as compared with family physicians.

1. Deyo RA, Rainville J, Kent DL. What can the history and physical examination tell us about low back pain. *JAMA* 1992; 26: 760-65.

2. Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet* 2009; 7; 373: 463-72. Review.

– Dr David Roselt

PAIN

Kroenke K, MJB, Damush TM, Wu J et al. Optimized Antidepressant Therapy and Pain Self-management in Primary Care Patients With Depression and Musculoskeletal Pain: A Randomized Controlled Trial. *JAMA* 2009;301(20):2099-110.

Context. Pain and depression are the most common physical and psychological symptoms in primary care, respectively. Moreover, they co-occur 30% to 50% of the time and have adverse effects on quality of life, disability, and health care costs.

Objective. To determine if a combined pharmacological and behavioral intervention improves both depression and pain in primary care patients with musculoskeletal pain and comorbid depression.

Design, setting, and patients. Randomized controlled trial (Stepped Care for Affective Disorders and Musculoskeletal Pain [SCAMP]) conducted at 6 community-based clinics and 5 Veterans Affairs general medicine clinics in Indianapolis, Indiana. Recruitment occurred from January 2005 to June

2007 and follow-up concluded in June 2008. The 250 patients had low back, hip, or knee pain for 3 months or longer and at least moderate depression severity (Patient Health Questionnaire 9 score ≥ 10).

Intervention. Patients were randomly assigned to the intervention (n=123) or to usual care (n=127). The intervention consisted of 12 weeks of optimized antidepressant therapy (step 1) followed by 6 sessions of a pain self-management program over 12 weeks (step 2), and a continuation phase of therapy for 6 months (step 3).

Main outcome measures. Depression (20-item Hopkins Symptom Checklist), pain severity and interference (Brief Pain Inventory), and global improvement in pain at 12 months.

Results. At 12 months, 46 of the 123 intervention patients (37.4%) had a 50% or greater reduction in depression severity from baseline compared with 21 of 127 usual care patients (16.5%) (relative risk [RR], 2.3; 95% confidence interval [CI], 1.5-3.2), corresponding to a much lower number of patients with major depression (50 [40.7%] vs 87 [68.5%], respectively; RR, 0.6 [95% CI, 0.4-0.8]). Also, a clinically significant ($\geq 30\%$) reduction in pain was much more likely in intervention patients (51 intervention patients [41.5%] vs 22 usual care patients [17.3%]; RR, 2.4 [95% CI, 1.6-3.2]), as was global improvement in pain (58 [47.2%] vs 16 [12.6%], respectively; RR, 3.7 [95% CI, 2.3-6.1]). More intervention patients also experienced benefits in terms of the primary outcome, which was a combined improvement in both depression and pain (32 intervention patients [26.0%] vs 10 usual care patients [7.9%]; RR, 3.3 [95% CI, 1.8-5.4]).

Conclusion. Optimized antidepressant therapy followed by a pain self-management program resulted in substantial improvement in depression as well as moderate reductions in pain severity and disability.

Comment: This well-conducted trial studied patients with major depression and moderate levels of chronic musculoskeletal pain. It showed substantial reductions in depression scores and modest reductions in pain and disability with optimized anti-depressant treatment followed by a pain self-management program compared with minimal changes with usual care. Nearly all of the differences between groups emerged in the first month when antidepressants were being optimized. The additional benefit of the pain management program is unclear, although it may have been the reason that the improvements were maintained in the intervention group for the 12-month follow-up period. Another possible reason is the longer duration of use of antidepressants, nine months versus only two months in the usual care group. Finally, there is some evidence that SNRIs and tricyclic antidepressants are better for chronic pain than SSRIs, and in this trial, the SNRI, venlafaxine, was the first-line antidepressant used by most of the intervention group.

Cost-effectiveness was not assessed in this study, but the added costs of the benefits shown in the intervention group would have the extra antidepressant costs and the costs of the pain self-management program.

The key message for doctors managing patients with

chronic pain and depression is to optimize anti-depressant medication with an SNRI antidepressant and encourage sustained use for a sustained effect. While pain self-management programs are a desirable addition for these patients, their availability is limited. Together, these measures result in only modest reductions in pain levels, so other pain-reduction measures may be required. – *Dr Michael Yelland*

Wiesinger B, Malke H, Englund E, Wänman A. Does a dose-response relation exist between spinal pain and temporomandibular disorders? *BMC Musculoskelet Disord* 2009;10:28. Department of Research and Development, Sundsvall Hospital, 85186 Sundsvall, Sweden. birgitta@wiesinger.se

Background. The aim of this study was to test whether a reciprocal dose-response relation exists between frequency/severity of spinal pain and temporomandibular disorders (TMD).

Methods. A total of 616 subjects with varying severity of spinal pain or no spinal pain completed a questionnaire focusing on symptoms in the jaw, head and spinal region. A subset of the population ($n = 266$) were sampled regardless of presence or absence of spinal pain. We used two different designs, one with frequency/severity of spinal pain, and the other, with frequency/severity of TMD symptoms as independent variable. All 616 participants were allocated to four groups, one control group without spinal pain and three spinal pain groups. The subjects in the subset were allocated to one control group without TMD symptoms and three TMD groups. Odds ratios (ORs) were calculated for presence of frequent TMD symptoms in the separate spinal pain groups as well as for frequent spinal pain in the separate TMD groups.

Results. The analysis showed increasing ORs for TMD with increasing frequency/severity of spinal pain. We also found increasing ORs for spinal pain with increasing frequency/severity of TMD symptoms.

Conclusion. This study shows a reciprocal dose-response-like relationship between spinal pain and TMD. The results indicate that these two conditions may share common risk factors or that they may influence each other. Studies on the temporal sequence between spinal pain and TMD are warranted.

Comment: This paper suggests an association between these two pain conditions. The authors highlight that recent studies have shown that genetic polymorphism, with influence on the metabolism of catecholamines, is highly associated with pain sensitivity and the risk for developing TMD. They postulate that central sensitization may be one possible explanation for co-morbidity between pain conditions at different locations, as well as the presence of allodynia and hyperalgesia. It is possible that reflex connections between nociceptors and the fusimotor-muscle spindle system may also be involved in the pathophysiologic mechanisms related to pain and dysfunction.

The full article is available free at <http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=19254384>

or via the abstract at PubMed at <http://www.ncbi.nlm.nih.gov/sites/entrez> searching for the paper or authors. – *Dr David Roselt*

Smeets RJ. Do lumbar stabilising exercises reduce pain and disability in patients with recurrent low back pain? *Aust J Physiother* 2009;55(2):138. Comment in: *Spine* 2009;34(3):221-28. Rehabilitation Foundation Limburg and Maastricht University, The Netherlands.

Question. Does a graded exercise program emphasising lumbar stabilising exercises reduce pain and disability at 12 months, compared with a walking program, for patients with recurrent low back pain?

Design. Randomised controlled trial.

Setting. A single private physiotherapy clinic in Sweden.

Participants. 71 patients with recurrent mechanical low back pain (>8 weeks duration, with at least 1 pain-free period during the past year) and without leg pain were allocated to one of two groups, using a concealed allocation process. The groups were comparable at baseline with respect to age, sex, proportion of participants who had sought care for back pain, and pain duration (approximately 10 years).

Interventions. The graded exercise program and the walking program were both 8 weeks' duration. The exercise program was individually supervised by a physiotherapist weekly for 45 minutes. In the walking program, patients met with a physiotherapist for 45 minutes in week 1 and again in week 8. The exercise program consisted primarily of stabilising exercises for the lumbar spine, commencing with re-learning activation of the transversus abdominis and multifidus muscles, with assistance of a pressure biofeedback cuff. Exercises were progressed according to clinical judgement, pain levels, and movement control and quality. Progression entailed incorporation of muscle activation in upright positions and during functional activities. Continued implementation of the exercises in daily life was encouraged. The reference group were instructed to walk for 30 minutes daily at the fastest pace that did not aggravate pain. Walking compliance was monitored with a self-completed daily diary.

Outcomes. The primary outcomes were perceived pain and disability at 12 months, measured by self-completed questionnaires returned by post. Disability was measured with the Oswestry Disability Questionnaire (scale 0-100, where 100 = maximum disability). Pain was measured with 100-mm visual analogue scale (where 100 = worst pain imaginable).

Results. At 12 months 86% of patients were followed up. At this time there was no clinically-important difference between the groups with respect to median (IQR) change in pain: exercise group -12 (-34 to -3); walking group -12 (-22 to 0). For disability at 12 months, the between-group difference in median scores was 8 on the Oswestry score: exercise group -10 (-20 to -2); walking group -2 (-12 to 2).

Conclusion. Lumbar stabilising exercises appear to have

a similar effect on pain and disability for patients with recurrent low back pain as a daily walking program.

PMID: 19534014 [PubMed - in process]

Comment: This comment on a recent study in *Spine*¹ highlights the lack of any added benefit for lumbar stabilizing exercises over a simple daily walking program.

1. Rasmussen-Barr E, Ang B, Arvidsson I, Nilsson-Wikmar L. Graded exercise for recurrent low-back pain: a randomized, controlled trial with 6-, 12-, and 36-month follow-ups. *Spine* 2009;34(3):221-28.

– Dr David Roselt

Sembrano JN. How Often is Low Back Pain Not Coming From the Back? *Spine* 2009;34(1):E27-E32.

Study design. Consecutive case series cohort.

Objective. To determine the relative frequencies of the spine, the sacroiliac (SI) joint, and the hip joint being the primary pain generator among patients presenting at a spine surgery clinic for low back pain (LBP).

Summary of background data. Identification of the primary pain generator in a patient with LBP is difficult. Possible pain sources include the lumbar spine, the SI joint, and the hip joint. Their relative frequencies among patients presenting at a spine surgeon's clinic have not been well established.

Methods. Three hundred sixty-eight new patients were seen at a single spine surgeon's clinic during a 10-month period. Of these, 289 (78.5%) complained primarily of LBP with or without leg pain. Seventy-seven had previous surgery. The remaining 200 cases were reviewed for all diagnostic tests performed, as well as the final diagnosis.

Results. One hundred sixty-four (82%) had spine pathology, but only 130 (65%) had spine-only pathology, whereas 35 (17.5%) had a combination of spine plus hip and/or SI joint pathology. An additional 16 (8%) had hip and/or SI joint pathology without spine pathology. Twenty (10%) had an undefined pain source. Overall, 25 (12.5%) had hip pathology, and 29 (14.5%) had SI joint pathology.

Conclusion. For patients presenting to a spine surgeon's clinic for LBP, up to 25% of patients may have significant pain contribution from the hip or SI joints, and an additional 10% will still have an undefined pain source even after diagnostic workup. This underscores the need for clinicians to be aware of nonspinal pain generators and to appropriately pursue alternative diagnoses.

Comment: This paper from *Spine* highlights that low back pain may arise from other structures, in addition to or even instead of a disc or related structure. The prevalence of sacroiliac joint pain in patients with chronic low back pain is about 15%.^{1,2,3} Hip pain may also be a source of pain in this region.

Initial clinical suspicion on the etiology of the patients' pain was arrived at using history, physical examination, and imaging findings. If the evidence was deemed strong

enough that there was high likelihood of what the underlying pain generator was, appropriate surgical or nonsurgical treatment was recommended. If there was need for confirmation of the clinical impression or if findings were unable to point to a specific pain generator, additional testing was performed – epidural steroid injections (interlaminar or transforaminal), facet blocks, selective nerve root blocks, discography, sacroiliac joint injections, hip joint injections, computerized tomography (CT) of the spine, pelvis or hip, magnetic resonance imaging (MRI) of the spine, and magnetic resonance arthrogram of the hip when indicated.

Treating these other pain generators will be necessary to get a satisfactory outcome in a lot of cases. The full paper (you may need to sign up/register if not already a subscriber – it is free and an excellent source of valuable knowledge in our field of interest) is available free at http://www.medscape.com/viewarticle/587533_print

1. Bogduk N. *The sacroiliac joint. Clinical Anatomy of Lumbar Spine and Sacrum*. 4th ed. New York; Churchill Livingstone, 2005, pp. 173-81.

2. Maigne JY, Aivaliklis A, Pfefer F. Results of sacroiliac joint double block and value of sacroiliac pain provocation tests in 54 patients with low back pain. *Spine* 1996;21(16):1889-92.

3. Schwarzer AC, Aprill CN, Bogduk N. The sacroiliac joint in chronic low back pain. *Spine* 1995 Jan 1;20(1):31-37.

– Dr David Roselt

Dworkin RH, Barbano RL, Tying SK et al. A randomized, placebo-controlled trial of oxycodone and of gabapentin for acute pain in herpes zoster. *Pain* 2009;142(3):209-17. Epub 2009 Feb 4. Comment in: *Pain* 2009;142(3):175-76. Department of Anesthesiology, University of Rochester School of Medicine and Dentistry, 601 Elmwood Avenue, Box 604, Rochester, NY 14642, USA. robert_dworkin@urmc.rochester.edu

Although acute pain in patients with herpes zoster can be severe and has a substantial impact on health-related quality of life, there have been no randomized clinical trials of oral medications specifically for its ongoing treatment. A randomized clinical trial was conducted in which 87 subjects >or=50 years of age with herpes zoster within 6 calendar days of rash onset and with worst pain in the past 24h >or=3 on a 0-10 rating scale initiated 7 days of treatment with famciclovir in combination with 28 days of treatment with either controlled-release (CR) oxycodone, gabapentin, or placebo. Subjects were evaluated for adverse effects of treatment, acute pain, and health-related quality of life. The results showed that CR-oxycodone and gabapentin were generally safe and were associated with adverse events that reflect well-known effects of these medications. Discontinuing participation in the trial, primarily associated with constipation, occurred more frequently in subjects randomized to CR-oxycodone (27.6%) compared with placebo (6.9%). Treatment with CR-oxycodone reduced the mean worst

pain over days 1-8 ($p=0.01$) and days 1-14 ($p=0.02$) relative to placebo but not throughout the entire 28-day treatment period as pain resolved in most subjects. Gabapentin did not provide significantly greater pain relief than placebo, although the data for the first week were consistent with a modest benefit. By demonstrating that CR-oxycodone is safe, generally adequately tolerated, and appears to have efficacy for relieving acute pain, the results of this clinical trial provide a foundation for evidence-based treatment for acute pain in herpes zoster.

PMID: 19195785 [PubMed - indexed for MEDLINE]

Comment: This randomized, placebo-controlled trial from Rochester, New York, by Robert Dworkin et al. of CR-oxycodone and of gabapentin for acute pain in herpes zoster suggests that oxycodone is superior to gabapentin, and should be considered for first-line use in treating acute pain associated with herpes zoster. It is important to treat the pain aggressively to minimize the risk of chronic pain ensuing. Don't forget to co-prescribe a laxative. – *Dr David Roselt*

Hay JL, White JM, Bochner F et al. Hyperalgesia in opioid-managed chronic pain and opioid-dependent patients. *J Pain* 2009;10(3):316-22. Epub 2008 Dec 19. Discipline of Pharmacology, Medical School North, University of Adelaide, SA, Australia. justin.hay@alumni.adelaide.edu.au

This observational study aimed to determine whether pain sensitivity in patients with noncancer chronic pain, taking either methadone or morphine, is similar to patients maintained on methadone for dependence therapy, compared with a control group. Nociceptive thresholds were measured on a single occasion with von Frey hairs, electrical stimulation, and cold pressor tests. In all subjects receiving methadone or morphine, nociceptive testing occurred just before a scheduled dose. Cold pressor tolerance values in patients with noncancer, chronic pain, treated with morphine and methadone, were 18.1 ± 2.6 seconds (mean \pm SEM) and 19.7 ± 2.3 seconds, respectively; in methadone-maintained subjects it was 18.9 ± 1.9 seconds, with all values being significantly ($P < .05$) lower than opioid-naïve subjects (30.7 ± 3.9 seconds). These results indicate that patients with chronic pain managed with opioids and methadone-maintained subjects are hyperalgesic when assessed by the cold pressor test but not by the electrical stimulation test. None of the groups exhibited allodynia as measured using the von Frey hairs. These results add to the growing body of evidence that chronic opioid exposure increases sensitivity to some types of pain. They also demonstrate that in humans, this hyperalgesia is not associated with allodynia.

Perspective. This article presents an observational study whereby the pain sensitivity of patients with chronic pain managed with opioids and opioid-maintained patients were compared with opioid-naïve patients. The results suggest that opioid use may contribute to an increase in the sensitivity

to certain pain experimental stimuli.

PMID: 19101210 [PubMed - indexed for MEDLINE]

Comment: This observational study from Adelaide, Australia, raises concerns about opioid use increasing sensitivity to certain types of pain and was observed with both methadone and morphine and is a potential drawback for opioid use for noncancer chronic pain. – *Dr David Roselt*

Soin A, Cheng J, Brown L et al. Functional outcomes in patients with chronic nonmalignant pain on long-term opioid therapy. *Pain Pract* 2008;8(5):379-84. Comment in: *Pain Pract* 2009;9(2):164; author reply 164. Department of Pain Management, Cleveland Clinic, Cleveland, Ohio 44195, USA.

Objectives. Although long-term opioid therapy for chronic nonmalignant pain (CNMP) is widely accepted, it is controversial as to whether long-term benefits outweigh detrimental side effects. This study examines the effect of long-term opioid therapy on quality of life in terms of both physical and mental health in patients with CNMP.

Methods. We retrospectively studied a cohort of patients with CNMP. With informed consent, data were collected prior to and at 6-36 months after the institution of opioid therapy in 67 patients with CNMP. The Short Form 36 (SF-36) health survey was used to compare self-reported measures of health-related quality of life in nine subscales. Visual analog scale (VAS) for pain intensity scores, disability status, and ability to return to work were also assessed. The pre- and post-therapy parameters were compared.

Results. The average scores of self-reported quality of life improved significantly in eight out of the nine parameters in the SF-36 after at least 6 months of opioid therapy. The increase in reported scores was statistically significant for physical functioning, physical role, bodily pain, general health, validity, social functioning, emotional role, and mental health. No significant changes were observed in reported health transition, VAS pain scores, disability status, or return to work.

Conclusions. We conclude that judicious use of opioid therapy may lead to improvement in perceived quality of life and certain aspects of functional capacity and daily activities in a highly selected group of patients with CNMP who have not responded to other therapeutic modalities for over 6 months.

PMID: 18844854 [PubMed - indexed for MEDLINE]

Comment: This retrospective cohort study of patients with CNMP provides some evidence of increase in reported scores that were statistically significant for physical functioning, physical role, bodily pain, general health, validity, social functioning, emotional role, and mental health. No significant changes were observed in reported health transition, VAS pain scores, disability status, or return to work. The authors thought a trial of opioid therapy may be indicated in a highly selected group of patients with CNMP who have

not responded to other therapeutic modalities for over six months. – *Dr David Roselt*

FRACTURE PREVENTION

Bischoff-Ferrari HA, Willett WC, Wong JB et al. Prevention of nonvertebral fractures with oral vitamin D and dose dependency: a meta-analysis of randomized controlled trials. *Arch Intern Med* 2009;169(6):551-61.

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Background. Antifracture efficacy with supplemental vitamin D has been questioned by recent trials.

Methods. We performed a meta-analysis on the efficacy of oral supplemental vitamin D in preventing nonvertebral and hip fractures among older individuals (> or =65 years). We included 12 double-blind randomized controlled trials (RCTs) for nonvertebral fractures (n = 42 279) and 8 RCTs for hip fractures (n = 40 886) comparing oral vitamin D, with or without calcium, with calcium or placebo. To incorporate adherence to treatment, we multiplied the dose by the percentage of adherence to estimate the mean received dose (dose x adherence) for each trial.

Results. The pooled relative risk (RR) was 0.86 (95% confidence interval [CI], 0.77-0.96) for prevention of nonvertebral fractures and 0.91 (95% CI, 0.78-1.05) for the prevention of hip fractures, but with significant heterogeneity for both end points. Including all trials, antifracture efficacy increased significantly with a higher dose and higher achieved blood 25-hydroxyvitamin D levels for both end points. Consistently, pooling trials with a higher received dose of more than 400 IU/d resolved heterogeneity. For the higher dose, the pooled RR was 0.80 (95% CI, 0.72-0.89; n = 33 265 subjects from 9 trials) for nonvertebral fractures and 0.82 (95% CI, 0.69-0.97; n = 31 872 subjects from 5 trials) for hip fractures. The higher dose reduced nonvertebral fractures in community-dwelling individuals (-29%) and institutionalized older individuals (-15%), and its effect was independent of additional calcium supplementation.

Conclusion. Nonvertebral fracture prevention with vitamin D is dose dependent, and a higher dose should reduce fractures by at least 20% for individuals aged 65 years or older.

PMID: 19307517 [PubMed - indexed for MEDLINE]

Comment: This meta-analysis from Zurich, Switzerland, is food for thought and suggests that vitamin D is underutilized and under-dosed, and that promoting increased use of vitamin D supplementation would be a cost-effective and efficacious therapeutic manoeuvre in the public health arena. – *Dr David Roselt*

TISSUE REPAIR

Khan KM, Scott A. Mechanotherapy: how physical therapists' prescription of exercise promotes tissue repair. *Br J Sports Med* 2009; 43: 247-51.

Mechanotransduction is the physiological process where cells sense and respond to mechanical loads. This paper reclaims the term "mechanotherapy" and presents the current scientific knowledge underpinning how load may be used therapeutically to stimulate tissue repair and remodelling in tendon, muscle, cartilage and bone. The purpose of this short article is to answer a frequently asked question "How precisely does exercise promote tissue healing?" This is a fundamental question for clinicians who prescribe exercise for tendinopathies, muscle tears, non-inflammatory arthropathies and even controlled loading after fractures. High-quality randomized controlled trials and systematic reviews show that various forms of exercise or movement prescription benefit patients with a wide range of musculoskeletal problems.

But what happens at the tissue level to promote repair and remodelling of tendon, muscle, articular cartilage and bone? The one-word answer is "mechanotransduction", but rather than finishing there and limiting this paper to 95 words, we provide a short illustrated introduction to this remarkable, ubiquitous, non-neural, physiological process. We also re-introduce the term "mechanotherapy" to distinguish therapeutics (exercise prescription specifically to treat injuries) from the homeostatic role of mechanotransduction. Strictly speaking, mechanotransduction maintains normal musculoskeletal structures in the absence of injury. After first outlining the process of mechanotransduction, we provide well-known clinical therapeutic examples of mechanotherapy – turning movement into tissue healing.

Comment: This paper from Karim Khan summarizes some of his work presented at the joint NZAMSM/AFMM/AAMM conference held at Palmerston North, NZ, 2-5 August 2007. It is well worth a read. The full paper is available at <http://bjsm.bmj.com/cgi/content/full/43/4/247>.

ELBOW

Scarpone M, Rabago DP, Zgierska A et al. The efficacy of prolotherapy for lateral epicondylitis: a pilot study. *Clin J Sport Med* 2008;18(3):248-54. Department of Family Medicine, University of Wisconsin-Madison, Madison, WI 53715, USA.

Objectives. To assess whether prolotherapy, an injection-based therapy, improves elbow pain, grip strength, and extension strength in patients with lateral epicondylitis.

Setting. Outpatient Sport Medicine clinic.

Study design. Double-blind randomized controlled trial.

Participants. Twenty-four adults with at least 6 months of refractory lateral epicondylitis.

Intervention. Prolotherapy participants received injections of a solution made from 1 part 5% sodium morrhuate, 1.5

parts 50% dextrose, 0.5 parts 4% lidocaine, 0.5 parts 0.5% sensorcaine and 3.5 parts normal saline. Controls received injections of 0.9% saline. Three 0.5-mL injections were made at the supracondylar ridge, lateral epicondyle, and annular ligament at baseline and at 4 and 8 weeks.

Outcome measures. The primary outcome was resting elbow pain (0 to 10 Likert scale). Secondary outcomes were extension and grip strength. Each was performed at baseline and at 8 and 16 weeks. One-year follow-up included pain assessment and effect of pain on activities of daily living.

Results. The groups were similar at baseline. Compared to Controls, Prolotherapy subjects reported improved pain scores (4.5 \pm 1.7, 3.6 \pm 1.2, and 3.5 \pm 1.5 versus 5.1 \pm 0.8, 3.3 \pm 0.9, and 0.5 \pm 0.4 at baseline and at 8 and 16 weeks, respectively). At 16 weeks, these differences were significant compared to baseline scores within and among groups ($P < 0.001$). Prolotherapy subjects also reported improved extension strength compared to Controls ($P < 0.01$) and improved grip strength compared to baseline ($P < 0.05$). Clinical improvement in Prolotherapy group subjects was maintained at 52 weeks. There were no adverse events.

Conclusions. Prolotherapy with dextrose and sodium morrhuate was well tolerated, effectively decreased elbow pain, and improved strength testing in subjects with refractory lateral epicondylitis compared to Control group injections.

Comment: This is a promising result for prolotherapy for this often recalcitrant condition. The concoction is a little complicated and may impede its uptake by the profession in general. The trial uses a normal saline control. A placebo arm is often problematic for an injection-type therapy, but waiting lists could be used, and would improve acceptance by the nonbelievers. We await the randomized controlled trial with this or a simpler mixture in the injectant. – *Dr David Roselt*

Educational Activities

Masters, Diploma, and Certificate Courses in Musculoskeletal Medicine

Flinders University Diploma/Certificate in Musculoskeletal Medicine

Date	Title/Key Resource Person	Venue	Provider	Contact	CME Points
2009	Due to Norm Broadhurst's retirement, this course will not be presented until his replacement is appointed	Flinders Medical Centre	School of Health Sciences, Bedford Park SA 5042	Mr Michael McKay, Ph +61 8 8201 3913; michael.mckay@flinders.edu.au	TBA

University of Otago Diploma/Certificate in Musculoskeletal Medicine

Date	Title/Key Resource Person	Venue	Provider	Contact	CME Points	
17-21 August 2009	<i>On campus papers</i> MSMX 701, Part 2	On campus course Uni of Otago, Christchurch	Uni of Otago	Enrolments: Veronica McGroggan Ph +64 3 364 1086 Fax +64 3 364 0909 <i>veronica.mcgroggan@otago.ac.nz</i> or Geoff Harding Ph +61 7 3269 5522 Fax +61 7 3269 6407 <i>drgeoffh@bigpond.net.au</i> website <i>www.uoc.otago.ac/departments/msm</i>	Mixture of points, including small group points	
March-June 2009	<i>Distance taught papers</i> MSMX 704: Pain					
July-October 2009	MSMX 711: Pain assessment (new paper)	Distance taught papers - fortnightly audioconferences ex University of Otago, Christchurch				
	MSMX 708: Pain management					
	MSMX 702: MSM tissues					
	MSMX 703: MSM disorders					

Australian School of Advanced Medicine, Macquarie University - Masters Degree in Musculoskeletal Medicine

Date	Title/Key Resource Person	Venue	Provider	Contact	CME Points
2010	Master of Advanced Medicine in Musculoskeletal Medicine	Sydney	Macquarie University, Sydney	A/Prof Rod Ayscough or A/Prof Michael Creswick via Scholar Manager Sharon Cleland Ph +61 2 9850 4019 Fax +61 2 9850 4010 sharon.cleland@mq.edu.au or visit website www.medicine.mq.edu.au	TBA

Australian College of Physical Medicine Fellowship Program

Date	Title/Key Resource Person	Venue	Provider	Contact	CME Points
2009	Fellowship Australian College of Physical Medicine, Part II (Part I is Masters in Physical Med or Musculoskeletal Med from Sydney or Macquarie Unis)	Sydney	Australian College of Physical Medicine	Shane Maloney Ph +61 2 9438 5088 Fax +61 2 9438 5755 admin@northsidephysicalmedicine.com.au or visit website www.physicalmedicineaustralia.com.au	TBA

Other Musculoskeletal Medicine Educational Activities

Date	Title/Key Resource Person	Venue	Provider	Contact	CME Points
17-19 July 2009	Australasian Musculoskeletal Medicine conference <i>Theme: Mastering Shoulders and Hips</i>	Marriott Resort and Spa, Surfers Paradise, Qld	AAMM, AFMM	DC Conferences PO Box 637 North Sydney NSW 2059 Ph 02 9954 4400 aamm2009@dcconferences.com.au website: www.dcconferences.com.au/aamm2009	
9-11 Nov 2009	Neural Prolotherapy Diagnosis and Treatment: knee, shoulder, elbow, low back, hip, Achilles tendon, and neck	Active Health Sports and Rehab Clinic, QE2 Sports Stadium, Christchurch, NZ	Dr John Lyftogt	Dr John Lyftogt Ph +64 3 328 7151 j_lyftogt@xtra.co.nz	
26-30 March 2010	International Conference on Low Back Pain: Spine in action - can chronicity be prevented	Rendezvous Hotel, Auckland	NZAMSM	www.musculoskeletal.co.nz	