Audit of conservative management of chronic low back pain in a secondary care setting – Part I: facet joint and sacroiliac joint interventions

Robin Chakraverty, Richard Dias

Abstract
The work of a chronic back pain service in secondary care in the West Midlands is reported. The service offers acupuncture, spinal injection procedures, osteopathy and a range of other interventions for patients whose back pain has not responded to conservative management. This section of the report focuses on injection procedures for lumbar facet joint and sacroiliac joint pain, which have been shown to be the cause of chronic low back pain in 16-40% and 13-19% of patients respectively. Diagnosis relies on the use of intra-articular or sensory nerve block injections with local anaesthetic. Possible treatments following diagnosis include intra-articular corticosteroid, radiofrequency denervation (for facet joint pain) or ligament prolotherapy injections (for sacroiliac joint pain). The results of several hospital audits are reported. At six month follow up, 50% of 38 patients undergoing radiofrequency denervation following diagnostic blocks for facet joint pain had improved by more than 50%, compared to 29% of 34 patients treated with intra-articular corticosteroid injection. Sixty three per cent of 19 patients undergoing prolotherapy following diagnostic block injection for sacroiliac joint pain had improved at six months, compared to 33% of 33 who had intra-articular corticosteroid. Both radiofrequency denervation and sacroiliac prolotherapy showed good long-term outcomes at one year.

Keywords
Facet joint, sacroiliac joint, radiofrequency denervation, prolotherapy, corticosteroid injection, diagnosis, chronic low back pain, acupuncture.

Introduction
Low back pain is a common condition which has a lifetime prevalence of 60-80% and remains a huge socioeconomic burden worldwide.¹ There are now several national guidelines on the management of acute low back pain based on current available evidence and although there are some differences between them, on the whole there is good agreement on best management during these early stages.¹ No such consensus exists for the management of chronic low back pain, however, and practitioners tend to work according to their own skills, experience and beliefs.

In the West Midlands, UK, general practitioners, physiotherapists involved in back pain triage centres, and other hospital consultants have the facility to refer patients with chronic low back pain to the musculoskeletal service at the Royal Orthopaedic Hospital. At the time of writing, two lead musculoskeletal physicians work as part of the Spinal Unit, supported by four general practitioner clinical assistants. Between them, this team offers experience and skills in spinal injection procedures, acupuncture, osteopathy, sports medicine, occupational medicine, rheumatology, disability assessment, rehabilitation and primary care, all relevant to the management of low back pain. Other members of the Spinal Unit include five spinal surgeons and two extended scope physiotherapy practitioners. A Pain Management Service is also provided at the hospital.

One pathway open to the patient with chronic low back pain who has failed to respond to appropriate conservative management, is to undergo spinal injections. A variety of clinical tests may be employed to aid decision making but unfortunately examination has limited specificity for both facet and sacroiliac pain and is beyond
The scope of this paper.2-4 These patients will often have very localised paraspinal or sacral sulcus tenderness but when the examination findings are masked by regional myofascial trigger point activity acupuncture is often employed before considering spinal injection. Acupuncture can help dampen down the trigger point activity revealing more discretely localised tenderness. Spinal imaging has a limited role in the diagnostic selection process.5

Spinal injections have two distinct roles: to provide diagnostic information on the source of the patient’s pain and to provide therapeutic benefit in terms of diminishing the patient’s pain and allowing some recovery of function. Previous studies have shown that in patients with chronic low back pain the main pain generator is the intervertebral disc in 40% of cases, the lumbar facet joints in 16-40% and the sacroiliac joint in 13-19%.3,4,6-8 Provocative discography is the diagnostic procedure of choice for pain secondary to internal disc disruption,9 but as such a diagnosis does not lead directly to a validated, non-surgical treatment option at this hospital, its use is reserved to the discretion of the spinal surgeons when planning a surgical procedure. The facet joint(s) may be diagnosed as the source of pain either by intra-articular injection of the facet joint(s) with local anaesthetic or by local anaesthetic block injection to the medial branches of the posterior primary rami, which are the sole sensory nerve supply from the facet joints.10 Each joint receives innervation from two medial branches (at the level of the facet joint and the level above) and so both branches need to be blocked to diagnose facet joint pain (Figure 1,A,B).11 The sacroiliac joint may be diagnosed similarly by intra-articular injection of local anaesthetic but as the sensory nerve supply is variable it is not feasible to diagnose through nerve blockade (Figure 1,C).12,13 These procedures require fluoroscopic control and the use of radio-opaque dye to confirm exact needle placement. Following local anaesthetic injections the facet or sacroiliac joints can only be confidently diagnosed as the pain source if there is significant pain relief during the local anaesthetic phase. Therefore the patient needs to be assessed prior to and within one hour of the procedure.

Once facet or sacroiliac joint pain has been diagnosed by local anaesthetic injection then a therapeutic response may be achieved by intra-articular injection of corticosteroid. In practice the corticosteroid can be injected at the same time as the local anaesthetic by mixing it with the injectate. Patients who fail to gain reasonable duration of pain relief from the corticosteroid may then undergo further interventions. For facet joint pain, radiofrequency denervation of the medial branches (thermal lesioning of the nerves) is a recognised treatment option.14 For sacroiliac joint pain, the variable nerve supply precludes denervation, but prolotherapy to the sacroiliac ligaments is a described, yet poorly researched option. This involves the injection of the ligaments with an osmotic or chemical irritant which causes a local, sterile inflammatory response, release of growth factors, fibroblast chemotaxis and proliferation and deposition of new collagen into the ligaments. Prolotherapy aims to strengthen these ligaments, thereby conferring increased joint stability and decreasing joint pain (figure 1, D).15

This series of papers presents the results of
several audits carried out at this hospital, assessing the outcomes of patients with chronic low back pain undergoing various interventions. This part presents the outcomes in patients who underwent spinal injection and interventional procedures for presumed facet joint or sacroiliac joint pain. Subsequent parts of the paper will be presented in future issues of the journal and will include outcomes following acupuncture.

**Methods**

Between October 2000 and February 2003 seven hospital audits were performed assessing the outcomes following facet joint and sacroiliac joint diagnostic and therapeutic procedures in patients with chronic low back pain attending spinal clinics at the Royal Orthopaedic Hospital, Birmingham (Table 1). For each audit period, consecutive patients were included. Diagnostic procedures evaluated included intra-articular facet joint injections, medial branch blocks and intra-articular sacroiliac joint injections. Patients rated their pain on a visual analogue scale (VAS) of 0 (no pain) to 10 (worst pain imaginable) before and after the procedure. Pain relief of 50% or more within the first hour after the injection(s) was deemed diagnostic.

Therapeutic procedures evaluated included intra-articular facet joint injections with corticosteroid and radiofrequency denervation of the medial branches for those patients with facet joint pain and intra-articular sacroiliac joint injections, with corticosteroid and sacroiliac ligament prolotherapy for patients with confirmed sacroiliac joint pain. For each procedure demographic information was recorded including patient age, sex and duration of symptoms. It is the usual practice of the author to obtain a VAS pain score and Oswestry Disability Index (ODI: a patient questionnaire for low back pain, standardized to 100) prior to interventions and on subsequent outpatient visits, and to ask patients to rate their percentage subjective global improvement. This information was therefore available for the purpose of some of the audits and 50% or more subjective improvement was considered a positive response. The results are presented using descriptive statistics, using the mean and range unless stated specifically in the text.

**Results**

A. Diagnostic Injections (Table 2)

1. **Intra-articular facet joint injections with local anaesthetic**

   Forty two patients (24 female) underwent lumbar

### Table 1 Summary of audited procedures and procedure methods.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Procedure details</th>
<th>Audit label*</th>
<th>Audit period</th>
<th>Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facet joint injection</td>
<td>Fluoroscopically guided, contrast confirmed, intra-articular injection &lt;2.5 mls 2% lignocaine + triamcinolone</td>
<td>A1 - diagnostic</td>
<td>October 2000-March 2001</td>
<td>Up to 6 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B1 - therapeutic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medial branch block</td>
<td>Fluoroscopically guided injection &lt;1ml 2% lignocaine to each medial branch of posterior primary rami</td>
<td>A2 - diagnostic</td>
<td>March-July 2003</td>
<td>1 hour post-injection</td>
</tr>
<tr>
<td>Sacroiliac joint injection</td>
<td>Fluoroscopically guided, contrast confirmed, intra-articular injection &lt;3 mls 2% lignocaine + triamcinolone</td>
<td>A3 - diagnostic</td>
<td>August 2001-July 2002</td>
<td>Up to 6 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B3 - therapeutic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiofrequency neurotomy</td>
<td>Fluoroscopically guided, x2 thermal lesions to each medial branch of posterior primary rami at 80C for 60 seconds following sensory (50Hz) and motor (2Hz) stimulation using Neurotherm Lesion Generator, Model JK4</td>
<td>B2 - therapeutic</td>
<td>April 2002-February 2004</td>
<td>Up to 12 months</td>
</tr>
<tr>
<td>Sacroiliac ligament prolotherapy</td>
<td>Fluoroscopically guided injection of ipsilateral iliolumbar and sacroiliac interosseus ligaments with either 2ml 50% Dextrose or 3ml P2G (phenol:glycerine:glucose) mixed with 1% lignocaine to make 5ml solution on 3 occasions over 4-8 week period</td>
<td>B4 - therapeutic</td>
<td>August 2001-February 2003</td>
<td>Up to 12 months</td>
</tr>
</tbody>
</table>

*Labels A1 etc cross-refer to subheadings of Results section
facet joint injections during the audit period. Between two and six joints were injected per patient. Thirty four patients (81%) noticed 50% or more pain relief during the local anaesthetic phase following the injections, and were presumed therefore to have probable facet joint pain. Mean subjective improvement in pain was 70%. Six patients (14%) reported no change in their pain and two (5%) were worse.

2. Medial branch blocks
Ten patients (six female), underwent medial branch block injections during the audit period. All patients had previously had good but temporary response to facet joint injections with corticosteroid and the medial branch block injections were performed to confirm the facet joints as the source of pain, prior to considering radiofrequency neurotomy. Average age was 51 (31-78) years. An average of three (two to six) spinal levels were blocked per patient. Six patients had positive responses to the blocks, reporting between 75 and 100% initial pain relief, and went on to have radiofrequency neurotomy at a later date. Four patients had negative response (ie facet joint pain was not confirmed) with between 0 and 25% pain relief.

3. Intra-articular sacroiliac joint injections with local anaesthetic
Fifty two patients (31 female) underwent sacroiliac joint injections during the audit period. Average age was 43 (17-74) years. Thirty three patients (63%) stated that they had noticed at least 50% subjective pain relief during the local anaesthetic phase, of whom 29 (56%) experienced over 70% improvement, and 16 (31%), 100% improvement. Average VAS pain score in positive responders pre-injection was 5.3 (2-9) and post injection was 1.0 (0-5). Nineteen patients felt no pain relief following the injections and sacroiliac joint pain was excluded.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Number of patients experiencing 50% or greater relief of pain during local anaesthetic (LA) phase of diagnostic spinal injection. (IA = intra-articular).</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA facet joint injection (LA)</td>
<td>Medial branch blocks (LA)</td>
</tr>
<tr>
<td>Number of patients injected</td>
<td>42</td>
</tr>
<tr>
<td>Diagnosis confirmed (%)</td>
<td>34 (81%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Patient demographic data and response to therapeutic spinal procedures. Positive responders are those achieving 50% or more global subjective improvement and are presented as a proportion of those reviewed at each time point (IA intra-articular, CS = corticosteroid).</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA injection (CS)</td>
<td>Radiofrequency neurotomy to medial branches</td>
</tr>
<tr>
<td>Facet joint</td>
<td>Sacroiliac joint</td>
</tr>
<tr>
<td>Number</td>
<td>34</td>
</tr>
<tr>
<td>Mean age (range) in years</td>
<td>65 (32-90)</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>15/19</td>
</tr>
<tr>
<td>Duration of pain (range) in years</td>
<td>5.6 (0.5-20)</td>
</tr>
<tr>
<td>Proportion of positive responders at 3 months (%)</td>
<td>18/34 (53%)</td>
</tr>
<tr>
<td>Proportion of positive responders at 6 months (%)</td>
<td>10/34 (29%)</td>
</tr>
<tr>
<td>Proportion of positive responders at 12 months (%)</td>
<td>-</td>
</tr>
</tbody>
</table>

B. Therapeutic Procedures (Table 3)

1. Intra-articular facet joint injections with corticosteroid
Thirty four patients (19 female) who had had facet joint pain confirmed by intra-articular local anaesthetic injection were assessed for therapeutic response to the corticosteroid. The average age was 56 years (32-90 years), and the average duration of pain was 5.6 years (0.5-20 years). Six (18%) reported at least 50% subjective global improvement for less than four weeks before pain returned to previous levels of severity, 10 (29%) for between four weeks...
and three months, eight (24%) for between three and six months and 10 (29%) had improvement that persisted for more than six months.

2. **Radiofrequency denervation of medial branches**

All 38 patients (26 females) undergoing the procedure had previously undergone intra-articular facet joint injection with significant, temporary relief of pain and had subsequently undergone diagnostic medial branch block injections with 50% or more reduction in pain. Average age was 57 years (30-85). Average duration of pain was five years (1-10). Between two and six nerves were denervated per patient. Mean pre-procedure VAS pain score was 7.6 (5-10) and ODI 44 (22-76). By three months post-procedure, 27 (73%) of the 38 patients were reporting at least 50% subjective improvement, mean 78% (50-100). In these patients, there was a mean improvement in the VAS pain score of 5.6 (2-10) and in the ODI of 19 (0-74). By six months 16 (50%) of the 32 patients so far reviewed reported average subjective improvement of 70% (50-100), with a mean improvement in VAS pain score of 5.3 (2-9) and in ODI of 19 (0-74). By 12 months, 12 (37%) of the 29 patients reviewed were continuing to report improvement averaging 77% (50-100), with improvement in VAS pain score of 4.2 (2-8) and in ODI of 29 (10-66). By 12 months, 11 of the 18 reviewed remained improved by 82% (50-100), with improvement in VAS pain score of 4.3 (3-6) and in ODI of 38 (18-68).

**Discussion**

There is now substantial evidence that the lumbar facet and sacroiliac joints may be implicated as pain sources in a significant proportion of patients suffering with chronic low back pain. Unfortunately, history and examination findings lack enough specificity to accurately diagnose either as the source of a patient’s pain, and spinal imaging is of limited value. The gold standard diagnostic test is to assess the pain relief from the local anaesthetic phase of image-guided injections into the joints or to the sensory nerve supply of the facet joints. It has been recommended that double diagnostic blocks using local anaesthetics with different durations of action are performed in order to account for a placebo response. To achieve the gold standard, this could involve multiple procedures to confirm or exclude a definitive diagnosis. In practice, in this hospital setting, intra-articular blocks are used and cortisone is added to the injectate. Therefore at one attendance, the block injection would have both diagnostic as well as potential therapeutic value to the patient. In those patients who have a positive diagnostic response, this may be confirmed in the case of the facet joint by performing medial branch block injections as a work-up towards radiofrequency neurotomy.
the case of the sacroiliac joint, double diagnostic blocks have not been used routinely in this setting.

For each audit period, intra-articular facet joint injections had a positive diagnostic value in 81% of patients, medial branch block injections in 60% and intra-articular sacroiliac joint injections 63%. The criteria used for the decision to proceed to diagnostic block injections were not evaluated and so little can be made of these figures, other than to confirm that the diagnostic yield was high enough to support the present clinical practice.

For those patients who had had the aetiology of their pain confirmed by the diagnostic block injection, it was shown that intra-articular cortisone injections provided a good response in over half of the patients with facet joint pain at three months, but by six months only 29% were continuing to experience benefit. Studies into the use of intra-articular facet joint injections have shown variable results. Some have found that corticosteroid has no more additional benefit when compared to saline injections alone and others have found that there is no difference in outcome following intra or peri-articular injection.18-20 In this setting, patients who achieved only temporary relief, however, became candidates for radiofrequency denervation (following medial branch block injections) and this procedure produced significant benefit in a greater proportion of patients, with 41% patients claiming improvement at one year. Previous randomised controlled trials on the outcomes of radiofrequency neurotomy have been hindered by inadequate diagnosis of facet joint pain, by non-adherence to adequate prior block injection. However, one study showed that at 12 months 44% of patients in the treatment group were improved at one year, compared to 13% of controls, and another found 45% of patients were improved at two years.21-23 For patients with confirmed sacroiliac joint pain, intra-articular sacroiliac corticosteroid injections led to significant improvement in one third of the audited patients at six months. Sacroiliac joint corticosteroid injections have been proven to be of benefit in sacroilitis,24 but there are no randomised controlled trials looking at the response to corticosteroid injection in patients with mechanical sacroiliac joint pain, which was the representative sample of the patients in this audit. Those with significant, temporary benefit may be candidates for sacroiliac ligament prolotherapy. This method of treatment has been performed at least since the 1930s,19 but most reports are descriptive and there are no outcome studies looking at long term benefit. The randomised controlled trials on prolotherapy have mostly been for chronic low back pain of unspecified origin, in which the sacroiliac ligaments were injected along with other ligaments of the lumbosacral region. Three trials showed a positive response to the prolotherapy solution with more than 50% reduction in pain or disability at six months in between 49-88% of the study groups, compared to 32–53% in the placebo groups.25-27 In each of these studies, six sets of prolotherapy injections were given per patient. One study which showed no treatment effect in the study or control groups used three sets of injections.28 There are no studies looking at prolotherapy for sacroiliac joint pain that has been confirmed by a previous intra-articular block injection. The one year outcomes from this audit, with 58% of patients reporting good benefit, would suggest that prolotherapy is a worthwhile intervention in those patients with confirmed sacroiliac joint pain who have failed to get long term relief from corticosteroid injection, and is worthy of further study.

Conclusion

Radiofrequency neurotomy for facet joint pain and prolotherapy for sacroiliac joint pain, appear to have good six and 12 month outcomes in those patients who fail to get adequate duration of pain relief following intra-articular corticosteroid injections in this hospital setting. However, there appears to be a continuing role for intra-articular corticosteroid injections, as the injectate can be delivered at the same time as the diagnostic local anaesthetic injection and a proportion of patients will achieve good pain relief for six months or more. Sacroiliac ligament prolotherapy is worthy of further study.

Reference list


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