Herniated lumbar disc

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QUESTIONS

What are the effects of drug treatments? ................................... 2
What are the effects of non-drug treatments? ................................ 5
What are the effects of surgery? ........................................ 10

INTERVENTIONS

DRUG TREATMENTS

Unknown effectiveness
- Analgesics ....................... 3
- Antidepressants.................... 3
- Corticosteroids (epidural injections) ...... 3
- Muscle relaxants................... 3

Unlikely to be beneficial
- Non-steroidal anti-inflammatory drugs. . . . 2

NON-DRUG TREATMENTS

Likely to be beneficial
- Spinal manipulation................. 6

Unknown effectiveness
- Acupuncture, ........................ 8
- Advice to stay active. ................... 5
- Exercise therapy .................... 7
- Heat or ice ............................ 6
- Massage .............................. 6

Unlikely to be beneficial
- Bed rest. .............................. 5
- Traction .............................. 8

SURGERY

Likely to be beneficial
- Microdiscectomy (as effective as standard discectomy) ................... 11
- Standard discectomy (short term benefit) ........................... ...0

Unknown effectiveness
- Automated percutaneous discectomy ...12
- Laser discectomy.................. 12

To be covered in future updates
- Artificial spinal discs
- Tumour necrosis factor antibodies

Covered elsewhere in Clinical Evidence
- Non-specific acute low back pain, p 01
- chronic low back pain, p 01

See glossary

Key Messages

• Herniated lumbar disc is a displacement of disc material (nucleus pulposus or annulus fibrosis) beyond the intervertebral disc space. The highest prevalence is among people aged 30–50 years, with a male to female ratio of 2 : 1.

• There is little evidence to suggest that drug treatments are effective in treating herniated discs.

  Non-steroidal anti-inflammatory drugs do not seem to improve symptoms of people with sciatica caused by disc herniation.

  We did not find any evidence examining the effectiveness of analgesics, antidepressants or muscle relaxants in people with herniated discs.

  We did not find any evidence of sufficient quality to allow us to judge the effectiveness of epidural injections of corticosteroids.

• With regard to non-drug treatments, spinal manipulation seems to increase self perceived improvement compared with placebo, although concerns exist regarding possible further herniation from spinal manipulation in people who are surgical candidates.

  Neither bed rest nor traction appear to be effective in treating people with sciatica caused by disc herniation.
We did not find enough evidence about advice to stay active, acupuncture, massage, exercise, heat or ice to be able to judge their efficacy in treating people with herniated discs.

- About 10% of people have sufficient pain after 6 weeks for surgery to become a consideration.
  Both standard discectomy and microdiscectomy appear to increase self reported improvement to a similar extent.
  We did not find sufficient evidence to judge the effectiveness of either automated percutaneous discectomy or laser discectomy.

**DEFINITION**
Herniated lumbar disc is a displacement of disc material (nucleus pulposus or annulus fibrosis) beyond the intervertebral disc space. The diagnosis can be confirmed by radiological examination; however, magnetic resonance imaging findings of herniated disc are not always accompanied by clinical symptoms. This review covers treatment of people who have clinical symptoms relating to confirmed or suspected disc herniation. It does not include treatment of people with spinal cord compression or people with cauda equine syndrome, which require emergency intervention. The management of non-specific acute low back pain, and chronic low back pain, are covered elsewhere in Clinical Evidence.

**INCIDENCE/PREVALENCE**
The prevalence of symptomatic herniated lumbar disc is about 1–3% in Finland and Italy, depending on age and sex. The highest prevalence is among people aged 30–50 years, with a male to female ratio of 2:1. In people aged between 25 years and 55 years, about 95% of herniated discs occur at the lower lumbar spine (L4–L5 level); disc herniation above this level is more common in people over 55 years of age.

**AETIOLOGY/RISK FACTORS**
Radiographical evidence of disc herniation does not reliably predict low back pain in the future or correlate with symptoms; 19–27% of people without symptoms have disc herniation on imaging. Risk factors for disc herniation include smoking (OR 1.7, 95% CI 1.0 to 2.5), weight bearing sports (e.g. weight lifting, hammer throw etc), and certain work activities such as repeated lifting. Driving a motor vehicle has been suggested to be a risk factor for disc herniation, although evidence is not conclusive (OR 1.7, 95% CI 0.2 to 2.7). This potential effect may be because the resonant frequency of the spine is similar to that of certain vehicles.

**PROGNOSIS**
The natural history of disc herniation is difficult to determine because most people take some form of treatment for their back pain, and a formal diagnosis is not always made. Clinical improvement is usual in most people, and only about 10% of people still have sufficient pain after 6 weeks to consider surgery. Sequential magnetic resonance images have shown that the herniated portion of the disc tends to regress over time, with partial to complete resolution after 6 months in two thirds of people.

**AIMS OF INTERVENTION**
To relieve pain; increase mobility and function; and improve quality of life.

**OUTCOMES**
Primary outcomes: pain, function, or mobility; individuals’ perceived overall improvement; quality of life; and adverse effects of treatment. Secondary outcomes: return to work; use of analgesia; and duration of hospital admission.

**METHODS**
Clinical Evidence search and appraisal May 2005.

**QUESTION**
What are the effects of drug treatments?

**OPTION**
NON-STERoidal ANTI-INFLAMMATORY DRUGS

One systematic review found no significant difference in overall improvement between non-steroidal anti-inflammatory drugs and placebo in people with sciatica caused by disc herniation.

**Benefits:**
Non-steroidal anti-inflammatory drugs versus placebo: We found one systematic review of medical treatments for sciatica caused by disc herniation. The RCTs compared non-steroidal anti-inflammatory drugs (NSAIDs; piroxicam 40 mg/day for 2 days or 20 mg/day for 12 days; indomethacin [indomethacin] 75–100 mg 3 times daily; phenylbutazone 1200 mg/day for 3 days or 600 mg/day for 2 days) versus placebo. The review found no significant difference between NSAIDs and placebo in global improvement after 5–30 days (search date 1998, 3 RCTs, 321 people; pooled AR for improvement in pain: 80/172 [46.5%] with NSAIDs v 57/149 [38.3%] with placebo; OR for global improvement 0.99, 95% CI 0.60 to 1.70; see comment below).

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The systematic review did not report the adverse effects of NSAIDs. NSAIDs may cause gastrointestinal complications (see non-steroidal anti-inflammatory drugs topic, p 01). Cyclo-oxygenase 2 (Cox 2) inhibitors have also recently been associated with an increased risk of cardiovascular events, leading to the withdrawal of rofecoxib in September 2004.

**Comment:**
The absolute numbers in the RCTs relate to the outcomes of improvement in pain (3 RCTs) and return to work (1 RCT). However, the meta-analysis used the outcome measure of global improvement. The relationship between these measures is unclear.

### OPTION ANALGESICS

We found no systematic review or RCTs on the use of analgesics for treatment of people with symptomatic herniated lumbar discs.

**Benefits:**
We found no systematic review or RCTs.

**Harms:**
We found no RCTs.

**Comment:**
None.

### OPTION ANTIDEPRESSANTS

We found no systematic review or RCTs on the use of antidepressants for treatment of people with symptomatic herniated lumbar discs.

**Benefits:**
We found no systematic review or RCTs.

**Harms:**
We found no RCTs.

**Comment:**
None.

### OPTION MUSCLE RELAXANTS

We found no systematic review or RCTs on the use of muscle relaxants for treatment of people with symptomatic herniated lumbar discs.

**Benefits:**
We found no systematic review or RCTs.

**Harms:**
We found no RCTs.

**Comment:**
None.

### OPTION CORTICOSTEROIDS (EPIDURAL INJECTIONS)

One systematic review provided limited evidence that epidural corticosteroid injections increased global improvement compared with placebo. However, one subsequent RCT found no significant difference between epidural corticosteroid injections plus conservative treatment and conservative treatment alone in pain, mobility, or ability to return to work at 6 months. Another subsequent RCT found no significant difference between epidural corticosteroid injection and control injection in pain, disability, or self rated improvement after 35 days. One RCT provided limited evidence that epidural corticosteroid injections were less effective at reducing leg pain and improving function than standard discectomy at 1–3 months, but found no significant differences between treatments at 2–3 years.

**Benefits:**
Epidural corticosteroids injections versus placebo or conservative treatment:
We found one systematic review of medical treatments for sciatica caused by disc herniation and two subsequent RCTs. The review compared four different doses of epidural corticosteroid injections (8 mL methylprednisolone 80 mg; 2 mL methylprednisolone 80 mg; 10 mL methylprednisolone 80 mg; and 2 mL methylprednisolone acetate 80 mg) versus placebo (saline or lidocaine [lignocaine] 2 mL) after follow up periods of 2, 21, and 30 days. The review found limited evidence that epidural corticosteroid increased the proportion of people with self perceived global improvement
Herniated lumbar disc

(which was not defined) compared with placebo. The result was of borderline significance (search date 1998, 4 RCTs of epidural corticosteroid, 265 people; 73/160 [45.6%] with corticosteroids vs 56/172 [32.5%] with placebo; OR 2.2, 95% CI 1.0 to 4.7). The first subsequent RCT compared epidural corticosteroid (3 injections of methylprednisolone 100 mg in 10 mL bupivacaine 0.25% during the first 14 days in hospital) plus conservative non-operative treatment versus conservative treatment alone.\textsuperscript{16} Conservative treatment involved initial bed rest and analgesia followed by graded rehabilitation (hydrotherapy, electroanalgesia, postural exercise classes) followed by physiotherapy. It found no significant difference between groups in mean pain scores at 6 weeks and 6 months measured on a visual analogue scale (36 people with disc herniation confirmed by magnetic resonance imaging; at 6 months: 32.9 [range 0–85.0] with corticosteroids vs 39.2 [range 0–100.0] with conservative treatment). It found no significant difference in mean mobility scores (Hannover Functional Ability Questionnaire: 61.8 [range 25.0–88.0] with corticosteroids vs 57.2 [range 13.0–100.0] with conservative treatment), in the proportion of people needing back surgery (2/17 [12%] with corticosteroids vs 1/19 [5.3%] with conservative treatment; RR 0.56, 95% CI 0.09 to 2.17), or in people returning to work within 6 months (11/14 [78.6%] with corticosteroids vs 11/17 [64.7%] with conservative treatment; RR 0.91, 95% CI 0.48 to 1.75).\textsuperscript{16}

Harms: Epidural corticosteroids injections versus placebo or conservative treatment: No serious adverse effects were reported in the RCTs included in the systematic review, although 26 people complained of transient headache or transient increase in sciatic pain.\textsuperscript{15} The first subsequent RCT did not report adverse effects of epidural injections.\textsuperscript{16} The second subsequent RCT reported that clinically significant adverse effects occurred in 2/43 (5%) people in the corticosteroid group and 3/42 (7%) people in the control group (P = 0.676).\textsuperscript{17} It reported that headache occurred in two people in each group, and thoracic pain occurred in one person with control. Epidural corticosteroid injection versus discectomy: The RCT found that two people in the epidural group (2/50 [4%]) had an incidental dural puncture and three (6%) had recurrent disc herniation within 2–3 year follow up period.\textsuperscript{18}

Comment: Epidural corticosteroid injection versus discectomy: The RCT allowed the 27 people in whom the epidural had failed to improve their symptoms (self assessment) to receive discectomy.\textsuperscript{18} This group was analysed as failures for the epidural steroid injections and also as a separate subgroup. Two further people in each group who completely crossed...
over to receive the treatment in the other group were analysed according to the intervention they received. There seemed to be multiple hypothesis tests without any mention of adjusting the analysis to account for this. Also, no attempt was made to blind the measurement of outcomes. Therefore these results should be interpreted with caution.

**QUESTION**  What are the effects of non-drug treatments?

**OPTION**  BED REST

One systematic review of conservative treatment found no RCTs on bed rest in people with symptomatic herniated discs. One subsequent RCT in people with sciatica found no significant difference between bed rest and watchful waiting for 2 weeks in people's perceived improvement, mean pain scores, mean disability scores, or mean satisfaction scores after 12 weeks.

**Benefits:** We found one systematic review and one subsequent RCT. The systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation identified no RCTs of bed rest for treatment of people with symptomatic herniated discs. The subsequent RCT compared bed rest at home (instructed to stay in the supine or lateral recumbent position with 1 pillow under the head) versus a control of watchful waiting (advised to be up and about whenever possible) for 2 weeks. Most people had nerve root compression on magnetic resonance imaging (109/161 people [68%] who had magnetic resonance imaging performed). It found no significant difference between bed rest and control in people's perceived improvement (183 people with sciatica, intensity sufficient to justify 2 weeks of bed rest as treatment; 87% with bed rest v 87% with control; OR 1.0, 95% CI 0.4 to 2.9; based on regression analysis; see comment below), mean pain scores (McGill Pain Questionnaire: 8 with bed rest v 7 with control; difference –0.6, 95% CI –3.3 to +2.1; based on regression analysis), mean disability scores (revised Roland Morris Disability Questionnaire: 15.2 with bed rest v 15.7 with control; difference –0.5, 95% CI –2.6 to +1.6; based on regression analysis), or mean satisfaction scores (7 with bed rest v 8 with control; difference –0.1, 95% CI –0.6 to +0.3; based on regression analysis) after 12 weeks.

**Harms:** The subsequent RCT did not report on harms of bed rest.

**Comment:** The regression analysis in the RCT adjusted odds ratios and differences between treatments for several variables including baseline differences in age, sex, presence or absence of paresis, disease duration, and people's history with respect to sciatica, among others. We found one further systematic review (search date 1996) of bed rest and advice to stay active in people with acute low back pain that found three RCTs that included people with sciatica or radiating pain. However, no further details were given in the review on the proportion of people in these RCTs with herniated discs. The review concluded that there was little evidence on bed rest specifically for herniated lumbar discs, although the RCTs they did find questioned the efficacy of bed rest for sciatica.

**OPTION**  ADVICE TO STAY ACTIVE

One systematic review of conservative treatments for sciatica caused by lumbar disc herniation found no RCTs on advice to stay active.

**Benefits:** We found one systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation, which found no RCTs of advice to stay active. We found no subsequent RCTs.

**Harms:** We found no RCTs.

**Comment:** None.
Herniated lumbar disc

**OPTION MASSAGE**

One systematic review identified no RCTs of massage in people with symptomatic lumbar disc herniation.

**Benefits:** We found one systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation, which found no RCTs of massage. We found no subsequent RCTs.

**Harms:** We found no systematic review or RCTs.

**Comment:** None.

**OPTION HEAT OR ICE**

One systematic review identified no RCTs of heat or ice for sciatica caused by lumbar disc herniation.

**Benefits:** We found one systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation, which identified no RCTs on the use of heat or ice for herniated lumbar discs. We found no subsequent RCTs.

**Harms:** We found no RCTs.

**Comment:** None.

**OPTION SPINAL MANIPULATION**

One RCT identified by a systematic review in people with sciatica caused by disc herniation found that spinal manipulation increased self perceived improvement after 2 weeks compared with a placebo of infrequent infrared heat. Another RCT identified by the review, comparing spinal manipulation, manual traction, exercise, and corsets, found no significant difference among groups in self perceived improvement after 1 month. One subsequent RCT found that spinal manipulation increased the proportion of people with improved symptoms compared with traction. Concerns exist regarding possible further herniation from spinal manipulation in people who are surgical candidates.

**Benefits:**

- **Spinal manipulation versus placebo:** We identified one systematic review that identified one RCT comparing spinal manipulation (every day if necessary) versus placebo (infrared heat 3 times weekly). It found that spinal manipulation increased overall self perceived improvement at 2 weeks compared with placebo (search date 1998, 1 RCT, 207 people; 98/123 [80%] with spinal manipulation v 56/84 [67%] with placebo; RR 1.19, 95% CI 1.01 to 1.32; NNT 8, 95% CI 5 to 109).

- **Spinal manipulation versus exercise therapy:** We identified one systematic review that identified one RCT. The RCT compared four interventions in a factorial design: spinal manipulation, manual traction, exercise therapy, and corsets. It found no significant difference among treatments in overall self perceived improvement after 28 days (search date 1998, 1 RCT, 322 people; quantitative results not reported).

- **Spinal manipulation versus traction:** We identified one systematic review (search date 1998, 1 RCT, 322 people) and one subsequent RCT. The RCT identified by the review compared four interventions in a factorial design (see above for details) and found no significant difference between treatments in overall self perceived improvement after 28 days. The subsequent RCT compared pulling and turning manipulation versus traction. It found that significantly more people were “improved” (absence of lumbar pain, improvement in lumbar functional movement) or “cured” (absence of lumbar pain, straight leg raising of > 70°, ability to return to work) with spinal manipulation compared with traction (112 people with symptomatic herniated lumbar disc; 54/62 [87%] with spinal manipulation v 33/50 [66%] with traction; RR 1.32, 95% CI 1.06 to 1.65; NNT 5, 95% CI 4 to 16; timescale not reported).

Musculoskeletal disorders

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Harms: Spinal manipulation versus placebo: The systematic review (search date 1998) reported in the benefits section did not report adverse effects.13 We found three additional systematic reviews assessing the risks of spinal manipulation.22–24 The first additional systematic review identified one review of 135 case reports of serious complications after spinal manipulation published between 1950 and 1980.22 However, the frequency of these effects was not certain. The case review attributed these complications to cervical manipulation, misdiagnosis, presence of coagulation dyscrasias, presence of herniated nucleus pulposus, or improper techniques. The second additional systematic review (search date 2001, 5 prospective observational studies) examined evidence of risks associated with spinal manipulation,23 The largest study included in the review (4712 treatments in 1058 people having both cervical and lumbar spinal manipulations) found that the most common reaction was local discomfort (53%), followed by headache (12%), tiredness (11%), radiating discomfort (10%), dizziness (5%), nausea (4%), hot skin (2%), and other complaints (2%). The incidence of serious adverse effects is reported as rare, and is estimated from published case series and reports to occur in one in 1–2 million treatments. The most common of these serious effects were cerebrovascular accidents (the total proportion of people having manipulations was not reported and the rate of this adverse effect cannot be estimated). However, it is difficult to assess whether such events are directly related to treatment. The third additional systematic review (search date not reported; 8 reviews, 9 prospective/retrospective studies, and 2 cross-sectional surveys) examined the safety of spinal manipulation for lumbar disc herniation.24 It estimated that the risk of causing further disc herniation or cauda equina syndrome by spinal manipulation in people in the US presenting with herniated lumbar disc is one in 3.7 million manipulations (see comments below). Spinal manipulation versus exercise therapy: The systematic review (search date 1998) did not report adverse effects.13 Spinal manipulation versus traction: The systematic review (search date 1998) did not report adverse effects.13 The subsequent RCT found that 2/60 (3%) people receiving traction had syncope; no adverse effects were reported in people receiving manipulation.21

Comment: In the second additional review examining risks of spinal manipulation, the percentages include both cervical and lumbar spinal manipulations, which may overestimate the effect of lumbar spinal manipulations.23 The authors of the review advise caution in interpreting these results as they are speculative and based on assumptions about the numbers of manipulations performed and unreported cases. The estimates calculated in the third additional systematic review of risks were based on rough estimates in the literature (best available) using what the author thought to be the most accurate, recent, or conservative values.24 This estimate is also prone to error owing to the possible lack of reporting of many cases of disc herniation or cauda equina syndrome. Mild symptoms after spinal manipulation are not included in these calculations. More reliable data are needed on the incidence of specific risks of spinal manipulation. It is unclear whether the populations studied in the RCTs cited included people who were surgical candidates for disc herniation. Concerns exist regarding possible further herniation from spinal manipulation in people who are surgical candidates.

OPTION EXERCISE THERAPY

We found no systematic review or RCTs comparing exercise therapy versus placebo or no treatment. One small RCT identified by a systematic review found no significant difference in global improvement between isometric exercise and manual traction in people with sciatica caused by disc herniation. Another RCT identified by the review, comparing spinal manipulation, manual traction, exercise, and corsets, found no significant difference among groups in self perceived improvement after 1 month.

Benefits: Exercise therapy versus placebo or no treatment: We found one systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation.13 It found no RCTs comparing exercise therapy with no treatment or placebo. We found no subsequent RCTs. Exercise therapy versus spinal manipulation: We identified one systematic review that identified one RCT.13 The RCT compared four interventions in a factorial design: spinal manipulation, manual traction, exercise therapy, and corsets.13 It found no significant difference among treatments in overall self perceived
improvement after 28 days (search date 1998, 1 RCT, 322 people; quantitative results not reported). **Exercise therapy versus traction:** We found two systematic reviews (search dates both 1998).\textsuperscript{13,25} Each review identified a different RCT. The RCT identified by the first review compared four interventions in a factorial design: spinal manipulation, manual traction\textsuperscript{G}, exercise, and corsets.\textsuperscript{13} It found no significant difference among treatments in overall self perceived improvement after 28 days (322 people; quantitative results not reported). The RCT identified by the second review compared isometric exercise (20 minutes/day for 5–7 days; abdominal, back, hip, and thigh muscle contractions held for 6–8 seconds, repeated 5–10 times for each muscle group in crook and side lying and supine positions) versus manual traction (10 minutes of static traction/day for 5–7 days; force 300 N).\textsuperscript{25} It found no significant difference between groups at the end of treatment in a global measure of improvement (50 people admitted for possible surgery for herniated lumbar disc, verified by myelogram; pain free or improved: 10/24 [38\%] with traction vs 10/26 [42\%] with exercise; difference reported as not significant; see comments below).

**Harms:** Neither of the reviews nor the included RCTs reported on the harms of exercise.\textsuperscript{13,25}

**Comment:** The global measure of improvement used in the RCT was assessed by a neurologist (blind to intervention received), based on a 4 point scale that ranged from “symptom free” to “unchanged”.\textsuperscript{25} An improvement was considered as: ≥ 15 cm increase in straight leg raising test; ≥ 2 cm increase in range of movement of lumbar spine in sagittal plane; ≥ 25\% reduction in pain measured by pain intensity (visual analogue score 0–10 cm) and pain distribution (pain drawing); or an improvement in activities of daily living (interview graded according to Roland Morris Disability Questionnaire\textsuperscript{G}). Only short term outcomes were measured, long term effectiveness has not been evaluated.

### Option: ACUPUNCTURE

One systematic review found insufficient evidence on the effects of acupuncture in people with herniated lumbar discs.

**Benefits:** **Acupuncture:** We found one systematic review (search date 1998) in people with back and neck pain, which identified one small RCT of acupuncture in people with sciatica.\textsuperscript{26} The RCT (30 people with acute sciatica; see comment below) compared acupuncture at electronically detected non-traditional points versus sham acupuncture. The review reported that the RCT found that acupuncture significantly improved three outcomes compared with sham acupuncture and reported that the RCT concluded that there was an overall benefit of acupuncture.\textsuperscript{26} However, the review disagreed with the RCT’s overall conclusion of benefit stating that it only found a significant difference between groups in 3/12 (25\%) outcome measures, and that there was no significant difference between acupuncture and sham acupuncture in pain intensity at rest, the most clinically relevant outcome, after 5 days (absolute numbers and P value not reported).\textsuperscript{26} The review found one small crossover RCT in people with neck and lumbar pain (see comment below).

**Harms:** No adverse effects from the two RCTs were reported in the systematic review.\textsuperscript{26}

**Comment:** In the RCT of people with acute sciatica, the acute sciatica may not have been caused by disc herniation.\textsuperscript{26} The review also included one small crossover RCT (42 people, radicular and pseudo radicular cervical and lumbar pain owing to stenosis, herniated disc, or both) that compared laser acupuncture at traditional points versus sham laser acupuncture. The review found no significant difference between groups in reduction of pain intensity after 24 hours, although pain was significantly improved in the laser acupuncture group at 15 minutes, 1 hour, and 6 hours compared with control. The sample sizes in both RCTs included in the review were small and provide little evidence of the effectiveness of acupuncture specifically in people with herniated lumbar disc.

### Option: TRACTION

One systematic review found no significant difference in overall global improvement between traction and placebo in people with sciatica and herniated lumbar disc. One small RCT identified by the review found no significant difference in global measure of improvement
between manual traction and isometric exercises in people with herniated lumbar disc. Another RCT identified by the review, comparing spinal manipulation, manual traction, exercise, and corsets, found no significant difference among groups in self perceived improvement after 1 month. One small RCT identified by the review found no significant difference in overall global improvement between autotraction and manual traction. Another small RCT identified by the review provided limited evidence that autotraction increased the proportion of people reporting a response immediately after treatment compared with passive traction.

**Benefits:**  
**Traction versus placebo or no treatment:** We found one systematic review (see comment below). The review compared global improvement for outcomes measured (including pain intensity, mobility of lumbar spine, straight leg raising test and function) between traction and a “placebo” control. It found no significant difference between traction and control in global improvement (search date 1998, 4 RCTs, 329 people with sciatica; OR 1.2, 95% CI 0.7 to 2.0). **Traction versus exercise therapy:** See benefits of exercise therapy, p 7. **Traction versus spinal manipulation:** See benefits of spinal manipulation, p 6. **Autotraction versus passive traction:** The review identified two RCTs comparing autotraction versus passive traction. The first RCT identified by the review compared autotraction (using the Lind technique; held for few seconds up to a couple of minutes with force between a third and full body weight, session lasting 1 hour) versus manual traction, (static traction held by therapist weight up to 30 kg twice, each pull lasting 5 minutes). The RCT found no significant differences between autotraction and manual traction in global assessment by neurologist (based on Lasèque’s sign, functional ability, and patient’s opinion) immediately after treatment, after 2 weeks, and 3 months (49 hospitalised people with confirmed herniated disc; AR for “no effect” at 2 weeks: 21/26 [81%] with autotraction v 16/23 [70%] with manual traction; 3 months: results same as for 2 weeks; P values and CIs not reported). The second RCT compared three sessions of autotraction (using the Natchev technique with a specially designed traction table) versus five sessions of passive traction (static traction held by chain to table of 35% of body weight in sessions of 45 minutes every day for 5 days). In the RCT, people classified their condition as “responsive” (fully recovered or improved), “unchanged”, or “worsened”. The RCT found that autotraction increased the proportion of people who classified themselves as responders immediately after treatment (44 people with herniated disc verified by computerised tomography scan or magnetic resonance imaging; 17/22 [77%] with autotraction v 4/22 [18%] with passive traction; P < 0.001; see comments below).

**Harms:** The systematic review and RCTs did not report adverse effects.

**Comment:**  
**Traction versus placebo or no treatment:** The RCTs identified by the review comparing traction versus placebo used a variety of traction techniques and also a variety of “placebo” treatments (comparisons: continuous traction, about 45 kg for 30 minutes/day for up to 3 weeks v infrared heat 3 times/week; intermittent motorised traction force of a third of body weight for 20 minutes/day for 5–7 days v simulated traction of 7 kg; motorised traction force of 40–70 kg for 20 minutes/day for 5–7 days v simulated traction [force not reported]; autotraction with a force of a third to full body weight in sessions lasting 1 hour plus hyperextension orthosis v orthosis only). The review included RCTs in people with sciatica, who may not have had lumbar disc herniation. An earlier systematic review (search date 1992) identified all four placebo controlled RCTs identified in the later review, but considered two of these RCTs as “acute low back pain” rather than herniated lumbar disc. Neither of the two RCTs considered to be in people with lumbar disc herniation by both systematic reviews found any significant differences between traction and placebo. **Autotraction versus passive traction:** In the RCT comparing autotraction versus “passive” traction it was only possible to determine results immediately after treatment, as non-responders in both groups were given the intervention from the other group and no intention to treat analysis was presented.
What are the effects of surgery?

**OPTION STANDARD DISCECTOMY**

One RCT found that standard discectomy increased self reported improvement at 1 year, but not at 4 and 10 years, compared with conservative treatment (physiotherapy). One RCT provided limited evidence that standard discectomy improved leg pain and function at 1–3 months compared with epidural corticosteroid injections. It found no significant difference between treatments after 2–3 years. Three RCTs found no significant difference in clinical outcomes between standard discectomy and microdiscectomy. Adverse effects were similar with both procedures. One RCT found no significant difference in satisfaction or pain between standard discectomy and video assisted arthroscopic microdiscectomy at about 30 months, although postoperative recovery was slower with standard discectomy.

**Benefits:**

**Standard discectomy versus conservative treatment:** We found two systematic reviews (search dates 1999 and not reported) which included the same RCT comparing standard discectomy versus conservative treatment (6 weeks of physiotherapy). Each person assessed and graded their improvement in terms of pain and function into four categories: “good” (completely satisfied), “fair”, “poor”, and “bad” (completely incapacitated for work because of pain). The RCT found that discectomy significantly increased the proportion of people reporting their improvement as “good” after 1 year compared with conservative treatment (126 people with symptomatic L5/S1 disc herniation; intention to treat analysis: 39/60 [65.0%] with surgery v 24/66 [36.4%] with conservative treatment; RR 1.79, 95% CI 1.30 to 2.18; NNT 3, 95% CI 2 to 9). However, at 4 and 10 years, there was no significant difference in the same outcome (at 4 years, AR for “good” improvement: 40/60 [66.7%] with surgery v 34/66 [51.5%] with conservative treatment; RR 1.29, 95% CI 0.96 to 1.56; at 10 years: 35/60 [58.3%] with surgery v 37/66 [56.1%] with conservative treatment; RR 1.04, 95% CI 0.73 to 1.32).

**Standard discectomy versus epidural corticosteroid injection:** See benefits of epidural corticosteroid injections, p 3.

**Standard discectomy versus microdiscectomy:** One systematic review (search date 1999) identified three RCTs comparing standard discectomy versus microdiscectomy. It did not perform a meta-analysis because outcomes were not comparable. The first RCT in the review found no significant difference between standard discectomy and microdiscectomy in the proportion of people who rated their operative outcome as “good”, “almost recovered”, or “totally recovered” at 1 year (60 people with lumbar disc herniation; intention to treat analysis: 26/30 [87%] with standard discectomy v 24/30 [80%] with microdiscectomy; RR 1.08, 95% CI 0.78 to 1.20). It found no difference between treatments in the change in preoperative and postoperative pain scores (visual analogue scale; P value not reported) or in time taken to return to work (10 weeks in both groups). The second RCT in the review found no significant difference between microdiscectomy and standard discectomy in pain in the legs or back (visual analogue scale, not specified) or in analgesia use at any point during the 6 week follow up (79 people with lumbar disc herniation; absolute numbers not reported). The third RCT (80 people) found that clinical outcomes and duration of sick leave were similar at 15 months, but the review did not provide further details.

**Standard discectomy versus video assisted arthroscopic microdiscectomy:** See benefits of microdiscectomy, p 11.

**Harms:**

**Standard discectomy versus conservative treatment:** The RCT included in both systematic reviews did not report on complications of standard discectomy. See harms of epidural corticosteroid injections, p 4.

**Standard discectomy versus epidural corticosteroid injection:** See harms of epidural corticosteroid injections.

**Standard discectomy versus microdiscectomy:** One systematic review reported that there was no significant difference between standard discectomy and microdiscectomy in perioperative bleeding, duration of stay, or scar tissue (numbers not reported). The first RCT included in the review reported one person in each group with a nerve root tear and, of the people having microdiscectomy,
one had a dural leak and one had suspected discitis.\textsuperscript{33} The second RCT included in the review did not report on the complications of either procedure.\textsuperscript{34} Complication rates were reported inconsistently in studies, making it difficult to combine results to produce overall rates. Rates of complications for all types of discectomy have been compiled (see table 1, p 16).\textsuperscript{31}

**Comment:** Standard discectomy versus conservative treatment: The RCT comparing standard discectomy versus conservative treatment had considerable crossover between the two treatment groups.\textsuperscript{32} Of 66 people randomised to receive conservative treatment, 17 received surgery; of 60 people randomised to receive surgery, one refused the operation.\textsuperscript{32} The results presented above are based on an intention to treat analysis. **Standard discectomy versus epidural steroid injection:** See comment in epidural corticosteroid injections, p 4. **Vascular complications:** One systematic review of published reports (search date not reported) found an incidence of 1-5 vascular complications in 10 000 disc operations since 1965.\textsuperscript{35} Reported risk factors for vascular complications included: previous disc or abdominal surgery leaving adhesions; chronic disc pathology from disruption or degeneration of anterior annulus fibrosus and anterior longitudinal ligament or peridiscal fibrosis; improper positioning of the patient; retroperitoneal vessels and operated disc in close proximity; and vertebral anomalies, such as hypertrophic spurs compressing vessels during operation. The systematic review did not state out of how many operations the 99 complications arose from, therefore we can not estimate the incidence of adverse vascular events from discectomy.\textsuperscript{35}

**OPTION MICRODISCECTOMY**

We found no RCTs comparing microdiscectomy versus conservative treatment. Three RCTs found no significant difference in clinical outcomes between microdiscectomy and standard discectomy. One RCT found no significant difference in satisfaction or pain between video assisted arthroscopic microdiscectomy and standard discectomy at about 30 months, although postoperative recovery was slower with standard discectomy. Two RCTs identified by a systematic review provided insufficient evidence on the effects of automated percutaneous discectomy compared with microdiscectomy.

**Benefits:** Microdiscectomy versus conservative treatment: We found no systematic review or RCTs. **Microdiscectomy versus standard discectomy:** See benefits of standard discectomy, p 10. **Video assisted arthroscopic microdiscectomy versus standard discectomy:** We found one RCT which compared video assisted arthroscopic microdiscectomy\textsuperscript{6} versus standard discectomy.\textsuperscript{6} It found no significant difference between video assisted arthroscopic discectomy and standard discectomy in the proportion of people who were “very satisfied” on a 4 point satisfaction scale after about 31 months (60 people with proved lumbar disc herniation and associated radiculopathy after failed conservative treatment; 22/30 [73\%] with microdiscectomy v 20/30 [67\%] with standard discectomy; RR 1.10, 95\% CI 0.71 to 1.34). There was also no significant difference in mean pain score (visual analogue scale from 0 [no pain] to 10 [severe and incapacitating pain]: 1.2 with microdiscectomy v 1.9 with standard discectomy). However, the mean duration of postoperative recovery was almost twice as long with open surgery as with microdiscectomy (27 days with microdiscectomy v 49 days with standard discectomy; P value not reported). **Microdiscectomy versus automated percutaneous discectomy:** BENEFITS[Se]e benefits of automated percutaneous discectomy compared with microdiscectomy.

**Harms:** Microdiscectomy versus conservative treatment: We found no systematic review or RCTs. **Microdiscectomy versus standard discectomy:** See harms of standard microdiscectomy, p 10. **Video assisted arthroscopic microdiscectomy versus open discectomy:** The RCT reported that one person having open discectomy had leakage of spinal fluid from the dural sac 2 weeks after the operation.\textsuperscript{36} No other postoperative complications or neurovascular injuries were observed in either the standard discectomy...
Herniated lumbar disc

or the microdiscectomy groups. Complication rates were reported inconsistently in studies, making it difficult to combine results to produce overall rates. Rates of complications for all types of discectomy have been compiled (see table 1, p 16). Microdiscectomy versus automated percutaneous discectomy: See harms of automated percutaneous discectomy, p 12.

Comment: None.

**OPTION AUTOMATED PERCUTANEOUS DISCECTOMY**

We found no RCTs comparing automated percutaneous discectomy versus either conservative treatment or standard discectomy. Two RCTs identified by a systematic review provided insufficient evidence on the clinical effects of automated percutaneous discectomy compared with microdiscectomy.

**Benefits:** Automated percutaneous discectomy versus conservative treatment: We found no systematic review or RCTs. Automated percutaneous discectomy versus standard discectomy: One systematic review (search date not reported) identified no RCTs comparing automated percutaneous discectomy (APD) versus standard discectomy. Automated percutaneous discectomy versus microdiscectomy: We found one systematic review (search date 1999), which identified two RCTs that were not directly comparable because there were differences in the equipment used. The first RCT was stopped prematurely, after an interim analysis at 6 months found that APD was associated with significantly lower success rate than microdiscectomy (71 people with radiographical confirmation of disc herniation; overall outcome was classified as "success" or "failure" by the clinician and a masked observer [details not reported]; AR for "success": 9/31 [29%] with APD v 32/40 [80%] with microdiscectomy; P < 0.001). However, the other RCT reported similar improvements in the composite clinical score with APD and microdiscectomy (scale 0–10, including back and leg pain, and sensory and motor deficit) at 2 years (40 people with radiographical confirmation of disc herniation; preoperative scores: 4.55 with APD v 4.20 with microdiscectomy; scores at 2 years: 8.23 with APD v 7.67 with microdiscectomy). More people in the APD group rated their surgical outcomes as "excellent" or "good" than did those in the microdiscectomy group 2 years after surgery (14/20 [70%] with APD v 11/20 [55%] with microdiscectomy; P = 0.33).

**Harms:** Automated percutaneous discectomy versus conservative treatment: We found no systematic review or RCTs. Automated percutaneous discectomy versus standard discectomy or microdiscectomy: The systematic review found that re-operations for recurrent or persistent disc herniations at the same level as the initial operations were reported more frequently with APD than with standard discectomy (83%, 95% CI 76% to 88% with APD v 49%, 95% CI 38% to 60% with standard discectomy). Automated percutaneous discectomy versus microdiscectomy: Overall, the systematic review found that re-operations for recurrent or persistent disc herniations at the same level as the initial operations were reported more frequently with APD than with microdiscectomy (83%, 95% CI 76% to 88% with APD v 64%, 95% CI 48% to 78% with microdiscectomy). The first RCT did not report adverse effects. The second RCT reported that no complications had occurred with APD, but did not comment on whether there had been any complications in the microdiscectomy group. The mean duration of recovery after surgery was longer in people who had microdiscectomy compared with those who had APD (mean weeks of postoperative recovery [range]: 22.9 weeks [4 weeks to 1 year] with microdiscectomy v 7.7 weeks [1 week to 26 weeks] with APD). Complication rates were reported inconsistently in studies, making it difficult to combine results to produce overall rates. Rates of complications for all types of discectomy have been compiled (see table 1, p 16).

Comment: None.

**OPTION LASER DISCECTOMY**

We found no systematic review or RCTs on the use of laser discectomy for treatment of people with symptomatic herniated lumbar discs.
Herniated lumbar disc

Benefits: Three systematic reviews (search dates 1999,30 not reported,31 and 200039) found no RCTs on the effectiveness of laser discectomy.32

Harms: We found no RCTs.

Comment: None.

GLOSSARY

Automated percutaneous discectomy Techniques using minimal skin incisions (generally several, all < 3–5 mm) to allow small instruments to be inserted, using radiography to visualise these instruments, and using extensions for the surgeon to reach the operative site without having to dissect tissues.

Autotraction The person provides the traction force on the traction table by pulling on the bar on the head of the table while his or her pelvis is held by a girdle and chain to the lower end of the table.

Cauda equina A collection of spinal roots descending from the lower part of the spinal cord, which occupy the vertebral canal below the spinal cord.

Cauda equina syndrome Compression of the cauda equina causing symptoms, including changes in perineal sensation (saddle anaesthesia), and loss of sphincter control.

Laseque’s sign The limitation of straight leg raising in a supine position usually associated with lumbar nerve root compression. Also, in sciatica, added foot dorsiflexion to a straight leg raise results in more pain.

Laser discectomy The surgeon places a laser through a delivery device that has been directed under radiographic control to the disc, and removes the disc material using the laser. It uses many of the same techniques used in automated percutaneous discectomy.

Manual traction A form of passive traction. The person lies supine on a plinth with varying degrees of flexion in the hip and knee joints. The traction force is exerted by the therapist using a belt placed around the therapist’s back or hips and attached behind and below the person’s knees. The traction force is adjusted by the therapist according to patient’s symptoms, with a maximum force of about 30 kg as measured by a force transducer in the belt.

Microdiscectomy Removal of protruding disc material, using an operating microscope to guide surgery.

Oswestry Disability Index Back specific, self reported questionnaire measuring pain and function in completing physical and social activities. The scale score ranges from 0 (no disability) to 100 (maximum disability).

Passive traction The person lies supine on a traction table with thighs flexed and supported by pillow over knees. The traction force is adjusted manually by the therapist to about 35% of person’s body weight, measured by a dynamometer, and then maintained by a chain connection to the foot of the bed. The traction force is adjusted regularly during the treatment session.

Roland Morris Disability Questionnaire a 24 item, self reported, disability scale specific to back pain recommended for use in primary care and community studies. Measures daily function in completing activities affected by back pain. The scale score ranges from 0 (no disability) to 24 (severe disability).

Standard discectomy Surgical removal, in part or whole, of an intervertebral disc, generally with loop magnification (i.e. eyepieces).

REFERENCES


Herniated lumbar disc


20. Waddell G, Feder G, Lewis M. Systematic reviews of bed rest and advice to stay active for acute low back pain. Br J Gen Pract 1997;47:647–652. Search date April 1996; primary sources Medline and Embase, checked abstracts of all back pain RCTs, citation tracking by hand and using ISI Science and Social Sciences Citation indices, and consulted experts and researchers.


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Herniated lumbar disc

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<table>
<thead>
<tr>
<th>Complications</th>
<th>Standard discectomy</th>
<th>Microdiscectomy</th>
<th>Percutaneous discectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (% [95% CI])</td>
<td>Studies (n)*</td>
<td>Mean (% [95% CI])</td>
</tr>
<tr>
<td>Operative mortality</td>
<td>0.15 (0.09–0.24)</td>
<td>25</td>
<td>0.06 (0.01–0.42)</td>
</tr>
<tr>
<td>Total wound infections</td>
<td>1.97 (1.97–2.93)</td>
<td>25</td>
<td>1.77 (0.92–3.37)</td>
</tr>
<tr>
<td>Deep wound infections</td>
<td>0.34 (0.23–0.50)</td>
<td>17</td>
<td>0.06 (0.01–0.23)</td>
</tr>
<tr>
<td>Discitis</td>
<td>1.39 (0.97–2.01)</td>
<td>25</td>
<td>0.67 (0.44–1.02)</td>
</tr>
<tr>
<td>Dural tear</td>
<td>3.65 (1.99–6.65)</td>
<td>17</td>
<td>3.67 (2.03–6.58)</td>
</tr>
<tr>
<td>Total nerve root injuries</td>
<td>3.45 (2.21–5.36)</td>
<td>8</td>
<td>0.84 (0.24–2.92)</td>
</tr>
<tr>
<td>Permanent nerve root injuries</td>
<td>0.78 (0.42–1.45)</td>
<td>10</td>
<td>0.06 (0.00–0.26)</td>
</tr>
<tr>
<td>Thrombophlebitis</td>
<td>1.55 (0.78–1.30)</td>
<td>13</td>
<td>0.82 (0.49–1.35)</td>
</tr>
<tr>
<td>Pulmonary emboli</td>
<td>0.56 (0.29–1.07)</td>
<td>14</td>
<td>0.44 (0.20–0.98)</td>
</tr>
<tr>
<td>Meningitis</td>
<td>0.30 (0.15–0.60)</td>
<td>5</td>
<td>Not reported</td>
</tr>
</tbody>
</table>
### Cauda equina syndrome
- Incidence: 0.22 (0.13–0.39)
- Number of studies: 3
- Event reporting: Not reported
- Adverse events: 0
- Control arm: Not reported
- Total: 0

### Psoas haematoma
- Incidence: Not reported
- Number of studies: 0
- Event reporting: Not reported
- Adverse events: 0
- Control arm: 4.65 (1.17–15.5)
- Total: 5

### Transfusions
- Incidence: 0.70 (0.19–2.58)
- Number of studies: 6
- Event reporting: 0.17 (0.08–0.39)
- Adverse events: 11
- Control arm: Not reported
- Total: 0

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*81 studies were included; 2 RCTs, 7 non-randomised controlled trials, 10 case control studies, and 62 case series.*