ClinicalEvidence

Herniated lumbar disc

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ABSTRACT

INTRODUCTION: 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 to 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 disc. METHODS AND OUTCOMES: We conducted a systematic review and aimed to answer the following clinical questions: What are the effects of drug treatments, non-drug treatments, and surgery for herniated lumbar disc? We searched: Medline, Embase, The Cochrane Library, and other important databases up to June 2010 (Clinical Evidence reviews are updated periodically; please check our website for the most up-to-date version of this review). We included harms alerts from relevant organisations such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA). RESULTS: We found 37 systematic reviews, RCTs, or observational studies that met our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions. CONCLUSIONS: In this systematic review, we present information relating to the effectiveness and safety of the following interventions: acupuncture, advice to stay active, analgesics, antidepressants, bed rest, corticosteroids (epidural injections), cytokine inhibitors (infliximab), discectomy (automated percutaneous, laser, microdiscectomy, standard), exercise therapy, heat, ice, massage, muscle relaxants, non-steroidal anti-inflammatory drugs (NSAIDs), percutaneous disc decompression, spinal manipulation, and traction.

QUESTIONS

INTERVENTIONS

Key points

- 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 to 50 years, with a male to female ratio of 2:1.

- There is little high-quality evidence to suggest that drug treatments are effective in treating herniated disc.

  NSAIDs and cytokine inhibitors do not seem to improve symptoms of sciatica caused by disc herniation.

  We found no RCT evidence examining the effects of analgesics, antidepressants, or muscle relaxants in people with herniated disc.

We found several RCTs that assessed a range of different measures of symptom improvement and found inconsistent results, so we are unable to draw conclusions on effects of epidural injections of corticosteroids.

- With regard to non-drug treatments, spinal manipulation seems more effective at relieving local or radiating pain in people with acute back pain and sciatica with disc protrusion compared with sham manipulation, although concerns exist regarding possible further herniation from spinal manipulation in people who are surgical candidates.

  Neither bed rest nor traction seem effective in treating people with sciatica caused by disc herniation.

  We found insufficient RCT evidence about advice to stay active, acupuncture, massage, exercise, heat, or ice to judge their efficacy in treating people with herniated disc.

- About 10% of people have sufficient pain after 6 weeks for surgery to become a consideration.

  Standard discectomy and microdiscectomy seem to increase self-reported improvement to a similar extent.

  We found insufficient evidence judging the effects of automated percutaneous discectomy, laser discectomy, or percutaneous disc decompression.

DEFINITION

Herniated lumbar disc is a displacement of disc material (nucleus pulposus or annulus fibrosis) beyond the intervertebral disc space. [1] The diagnosis can be confirmed by radiological examination. However, MRI findings of herniated disc are not always accompanied by clinical symptoms. [2] [3] This review covers treatment of people with clinical symptoms relating to confirmed or suspected disc herniation. It does not include treatment of people with spinal cord compression, or people with cauda equina 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% to 3% in Finland and Italy, depending on age and sex. [4] The highest prevalence is among people aged 30 to 50 years, [5] with a male to female ratio of 2:1. [6] In people aged 25 to 55 years, about 95% of herniated discs occur at the lower lumbar spine (L4/5 and L5/S1 level); disc herniation above this level is more common in people aged over 55 years. [7] [8]

AETIOLOGY/ RISK FACTORS

Radiographical evidence of disc herniation does not reliably predict low back pain in the future, or correlate with symptoms; 19% to 27% of people without symptoms have disc herniation on imaging. [2] [9] 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), 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 inconclusive (OR 1.7, 95% CI 0.2 to 2.7). [6] [10] [11]

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. [6] Clinical improvement is usual in most people, and only about 10% of people still have sufficient pain after 6 weeks to consider surgery. Sequential MRIs 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. [12]

AIMS OF INTERVENTION

To relieve pain; increase mobility and function; improve quality of life; and minimise adverse effects of treatments.

OUTCOMES

Primary outcomes: pain, including global symptom relief; functional improvement; patient perception of 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 June 2010. The following databases were used to identify studies for this systematic review: Medline 1966 to June 2010, Embase 1980 to June 2010, and The Cochrane Database of Systematic Reviews, May 2010 (online; 1966 to date of issue). An additional search within The Cochrane Library was carried out for the Database of Abstracts of Reviews of Effects (DARE) and Health Technology Assessment (HTA). We also searched for retractions of studies included in the review. Abstracts of the studies retrieved from the initial search were assessed by an information specialist. Selected studies were then sent to the contributor for additional assessment, using predetermined criteria to identify relevant studies. Study design criteria for inclusion in this review were: published systematic reviews of RCTs and RCTs in any language, at least single blinded, and containing >20 people of whom >80% were followed up. There was no minimum length of follow-up required to include trials. We excluded all trials described as "open", "open label", or not blinded unless blinding was impossible. We included systematic reviews of RCTs and RCTs where harms of an included intervention were studied applying the same study design criteria for inclusion as we did for benefits. In addition we use a regular surveillance protocol to capture harms alerts from organisations such as the FDA and the MHRA, which are added to the reviews as re-

quired. The contributors used confidence interval analysis [13] and chi-square test analysis from PEPI version 4.0 [14] in their own calculations, which are presented in the review. To aid readability of the numerical data in our reviews, we round many percentages to the nearest whole number. Readers should be aware of this when relating percentages to summary statistics such as relative risks (RRs) and odds ratios (ORs). We have performed a GRADE evaluation of the quality of evidence for interventions included in this review (see table, p 62). The categorisation of the quality of the evidence (high, moderate, low, or very low) reflects the quality of evidence available for our chosen outcomes in our defined populations of interest. These categorisations are not necessarily a reflection of the overall methodological quality of any individual study, because the Clinical Evidence population and outcome of choice may represent only a small subset of the total outcomes reported, and population included, in any individual trial. For further details of how we perform the GRADE evaluation and the scoring system we use, please see our website (www.clinicalevidence.com).

QUESTION What are the effects of drug treatments for herniated lumbar disc?

OPTION ANALGESICS

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about analgesics in the treatment of people with symptomatic herniated lumbar disc.

Benefits and harms

Analgesics:

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

Further information on studies

Comment: None.

OPTION ANTIDEPRESSANTS

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about antidepressants in the treatment of people with symptomatic herniated lumbar disc.

Benefits and harms

Antidepressants:

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

Further information on studies

Comment: None.

OPTION CORTICOSTEROIDS (EPIDURAL INJECTIONS)

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found several RCTs, which assessed a range of different measures of symptom improvement and found inconsistent results, so we are unable to draw conclusions on the effects of epidural injections of corticosteroids.

Benefits and harms

Epidural corticosteroid injections versus no epidural corticosteroid injection:

We found 5 systematic reviews assessing epidural corticosteroid injections in people with radicular pain caused by disc herniation. [15] [16] [17] [18] [19] The first review (search date 1998, 4 RCTs, 332 people) performed a meta-analysis assessing patient perception of improvement, which we report below. [15] The second systematic review (search date 2003, 3 RCTs, none included in the first review, 264 people) did not perform a meta-analysis because of heterogeneity among trial parameters, so we report results from each RCT it identified separately. [16] The third systematic review (search date 2008, 2 RCTs, 80 people) of caudal epidural injections identified one additional RCT not included in previous reviews and did not include a meta-analysis, so we also report this RCT separately. [17] The fourth systematic review (search date 2008, 2 RCTs, 215 people) of transforaminal epidural injections did not find any additional RCTs and did not include a meta-analysis, so we do not report it further. [18] The fifth systematic review (search date 2008, 3 RCTs, 437 people) of lumbar interlaminar epidural injections also did not include a meta-analysis. It included two RCTs identified by the first review but reported on different outcomes and included one further RCT not identified by any of the other reviews, so we report all three RCTs separately. [19] We found one additional RCT not included by any of the reviews [20] and one subsequent RCT, which we also report below. [21]

Pain

Compared with no epidural corticosteroid Epidural corticosteroids may be more effective at improving limb pain at 2 weeks, but may be no more effective after more than 2 weeks in people with disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[16] Systematic review	49 people with radiologically confirmed disc herniation Data from 1 RCT	**Proportion of people with symptom relief , 3 months** 54% with triamcinolone interlaminar perineural injection 40% with placebo (saline) interlaminar perineural injection plus intramuscular triamcinolone Absolute numbers not reported Placebo group received triamcinolone 10 mg intramuscularly	Significance not assessed Randomisation method not reported		
[16] Systematic review	160 people with lower-limb pain caused by confirmed disc herniation Data from 1 RCT	**Proportion of people with symptom relief , 12 months** 65% with corticosteroid injections 65% with saline placebo injection Absolute numbers not reported	Reported as not significant P value not reported	⟷	Not significant
[17] Systematic review	23 people with nerve root compromise Data from 1 RCT	**Proportion of people with improvement in back and leg pain (unspecified) , 4 weeks** with caudal corticosteroid injection of 25 mL triamcinolone acetonide 80 mg with or without 0.5% procaine hydrochloride with placebo (25 mL saline injection) Absolute results not reported 2 caudal injections were given, the first after admission to the trial, and the second after 2 weeks	Reported as significant in favour of corticosteroid injection No further data reported		

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[17] Systematic review	23 people with nerve root compromise Data from 1 RCT	**Proportion of people with improvement in back and leg pain (unspecified) , 12 months** with caudal corticosteroid injection of 25 mL triamcinolone acetonide 80 mg with or without 0.5% procaine hydrochloride with placebo (25 mL saline injection) Absolute results not reported 2 caudal injections were given, the first after admission to the trial, and the second after 2 weeks	Reported as no significant difference between groups at 12 months No further data reported	⟷	Not significant
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Proportion of people with improvement in leg pain (unspecified) measured by visual analogue scale (VAS) , 3 weeks** with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% with 2 mL normal saline Absolute results not reported Interlaminar epidural injection	Reported as no significant difference between groups No further data reported by review	⟷	Not significant
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Proportion of people with improvement in leg pain (unspecified) measured by Likert scale , 3 weeks** 61% with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% 40% with 2 mL normal saline Absolute numbers not reported Interlaminar epidural injection	P <0.01	○○○	triamcinolone 80 mg plus 10 mL bupivacaine 0.25%
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Proportion of people with improvement in leg pain (unspecified) measured by VAS , 6 weeks** with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% with 2 mL normal saline Absolute results not reported	Reported as no significant difference between groups No further data reported by review	⟷	Not significant
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Proportion of people with improvement in leg pain (unspecified) measured by Likert scale , 6 weeks** with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% with 2 mL normal saline Absolute results not reported	Reported as no significant difference between groups No further data reported by review	⟷	Not significant
[19] Systematic review	158 people with sciatica caused by herniated nucleus pulposus Data from 1 RCT	**Improvement in leg pain (unspecified) , 6 weeks** with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) with 1 mL isotonic saline Absolute results not reported Interlaminar epidural injection	P = 0.03	○○○	methylprednisolone acetate (80 mg and 8 mL of isotonic saline)

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		Greater improvement with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) than with 1 mL isotonic saline			
[19] Systematic review	158 people with sciatica caused by herniated nucleus pulposus Data from 1 RCT	**Improvement in leg pain (unspecified) , 3 months** with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) with 1 mL isotonic saline Absolute results not reported Interlaminar epidural injection	Reported as no significant differences between groups No further data reported	⟷	Not significant
[19] Systematic review	51 people with lumbar root compression documented by neurological deficit and abnormality noted on myelography Data from 1 RCT	**Pain (unspecified) , 3 months** with 80 mg methylprednisolone (2 mL) with 2 mL normal saline Absolute results not reported Interlaminar epidural injection	Reported as no significant differences between groups No further data reported	⟷	Not significant
[19] Systematic review	151 people with lumbar root compression documented by neurological deficit and abnormality noted on myelography Data from 1 RCT	**Pain (unspecified) , 14 months** with 80 mg methylprednisolone (2 mL) with 2 mL normal saline Absolute results not reported	Reported as no significant difference between groups No further data reported	⟷	Not significant
[20] RCT	85 people with sciatica caused by herniated disc	**Mean change in pain scores from baseline measured by unspecified VAS , 35 days** –30.3 mm with epidural corticosteroid injections (2 mL prednisolone acetate at 2-day intervals for a total of 3 injections) –25.2 mm with placebo (2 mL isotonic saline injection)	Mean difference –5.1 95% CI –18.7 to +8.4	⟷	Not significant
[21] RCT	76 people with leg and back pain caused by herniated disc	**Improvement in leg pain measured by VAS score , 3 months** mean change of 27.4 with methylprednisolone 40 mg plus local anaesthetic mean change of 24.3 with local anaesthetic alone The local anaesthetic used was 2 mL bupivacaine 0.25%	Significance not assessed		
[21] RCT	124 people with leg and back pain caused by herniated disc (76 people) or spinal stenosis (48 people)	**Improvement in back pain measured by VAS score , 3 months** mean change of 6.9 with methylprednisolone 40 mg plus local anaesthetic mean change of 9.9 with local anaesthetic alone Baseline range 34.4 to 38.1 The local anaesthetic used was 2 mL bupivacaine 0.25%	P = 0.57	⟷	Not significant

No data from the following reference on this outcome. [15]

Functional improvement

Compared with no epidural corticosteroid Epidural corticosteroids may be no more effective in the longer term at improving disability, as measured by the Roland Morris Disability Questionnaire and Oswestry Disability Index scores, or functional outcomes such as straight leg raising and lumbar flexion, in people with disc herniation (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[20] RCT	85 people with sciatica caused by herniated disc	**Roland Morris Disability Questionnaire score (mean change from baseline) , 35 days** –5.3 with epidural corticosteroid injections (2 mL prednisolone acetate at 2-day intervals for a total of 3 injections) –3.2 with placebo (2 mL isotonic saline injection)	ARR –2.1 95% CI –5.0 to +0.8	⟷	Not significant
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Oswestry Disability Index , 3 weeks** with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% with 2 mL normal saline Absolute results not reported Interlaminar epidural injection Greater improvement with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% than with 2 mL normal saline	Reported as significant difference; see further information on studies P value not reported	○○○	triamcinolone 80 mg plus 10 mL bupivacaine 0.25%
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Oswestry Disability Index , 6 weeks** with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% with 2 mL normal saline Absolute results not reported Interlaminar epidural injection	Reported as no significant difference; see further information on studies P value not reported	⟷	Not significant
[19] Systematic review	158 people with sciatica due to herniated nucleus pulposus Data from 1 RCT	**Oswestry Disability Index , 3 weeks** with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) with 1 mL isotonic saline Absolute results not reported Interlaminar epidural injection Slightly greater improvement with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) than with isotonic saline 1 mL	Significance not assessed		
[19] Systematic review	158 people with sciatica due to herniated nucleus pulposus Data from 1 RCT	**Oswestry Disability Index , 3 months** with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) with 1 mL isotonic saline	Reported as not significant No further data reported	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		Absolute results not reported			
[19] Systematic review	228 people with unilateral sciatica, possibly caused by disc herniation Data from 1 RCT	**Oswestry Disability Index 75% improvement in scores , 52 weeks** 32.5% with triamcinolone 80 mg plus 10 mL bupivacaine 0.25% 29.6% with 2 mL normal saline Interlaminar epidural injection	Significance not assessed; see further information on studies		
[21] RCT	76 people with leg and back pain caused by herniated disc	**Mean change in Oswestry Disability Index , 3 months** 13.6 with methylprednisolone 40 mg plus local anaesthetic 3.8 with local anaesthetic alone Baseline values were 43.4 (interquartile range [IQR] 32–54) for methylprednisolone plus local anaesthetic and 46.6 (IQR 34–58) for local anaesthetic alone The local anaesthetic used was 2 mL bupivacaine 0.25%	Significance not assessed		

No data from the following reference on this outcome. [15] [16] [17]

Patient perception of improvement

Compared with no epidural corticosteroid Epidural corticosteroids may be more effective at increasing subjective global improvement and patient satisfaction in the short term only (2 weeks), but may be no more effective in the longer term (after 2 weeks) in people with disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[15] Systematic review	332 people 4 RCTs in this analysis	**Proportion of people with self-perceived global improvement (which was not defined) , 2 to 30 days** 73/160 (46%) with epidural corticosteroid injections 56/172 (33%) with placebo Corticosteroids used were 8 mL methylprednisolone 80 mg; 2 mL methylprednisolone 80 mg; 10 mL methylprednisolone 80 mg; and 2 mL methylprednisolone acetate 80 mg	OR 2.2 95% CI 1.0 to 4.7	⟷	Not significant
[20] RCT	85 people with sciatica caused by herniated disc	**People rating improvement as "recovery" or "marked improvement" , 35 days** 21/43 (49%) with epidural corticosteroid injections (2 mL prednisolone acetate at 2-day intervals for a total of 3 injections) 20/42 (48%) with placebo (2 mL isotonic saline injection)	P = 0.91	⟷	Not significant

No data from the following reference on this outcome. [16] [19] [17] [21]

Need for surgery

Compared with no epidural corticosteroid We don't know if epidural corticosteroid injection is more effective at reducing the need for surgery in the short term (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for surgery					
[19] Systematic review	158 people with sciatica caused by herniated nucleus pulposus Data from 1 RCT	**Proportion having back surgery , 12 months** 26% with methylprednisolone acetate (80 mg and 8 mL of isotonic saline) 25% with 1 mL isotonic saline Absolute numbers not reported Interlaminar epidural injection	Reported as not significant No further data reported	⟷	Not significant
[16] RCT	55 people for whom 6 weeks of physiotherapy (undefined), oral use of NSAIDs, and bracing had failed	**Proportion of people having surgery , end of treatment period** 8/28 (29%) with transforaminal corticosteroid plus anaesthetic 18/27 (67%) with injections of anaesthetic alone The corticosteroid group received up to 4 injections of 1 mL betamethasone (6 mg/mL) plus 1 mL bupivacaine 0.25%	RR 0.43 95% CI 0.23 to 0.82 NNT 3 95% CI 2 to 6 Contributors' own calculations	●●○	transforaminal corticosteroid plus anaesthetic

No data from the following reference on this outcome. [15] [17] [20] [21]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[15] Systematic review	332 people 4 RCTs in this analysis	**Adverse effects , 2 to 30 days** with epidural corticosteroid injections with placebo Absolute results not reported No serious adverse effects were reported in the RCTs identified by the first systematic review, although 26 people complained of transient headache or transient increase in sciatic pain			
[16] RCT	264 people 3 RCTs in this analysis	**Adverse effects** with epidural corticosteroid injection with placebo injection The review noted a 1.9% incidence of headache with epidural injections in one RCT, and a retroperitoneal haematoma in one person having anticoagulation treatment in another RCT			

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[20] RCT	85 people with sciatica caused by herniated disc	**Clinically important adverse effects , 35 days** 2/43 (5%) with epidural corticosteroid injections (2 mL prednisolone acetate at 2-day intervals for a total of 3 injections) 3/42 (7%) with placebo (2 mL isotonic saline injection) The RCT reported that headache occurred in two people in each group, and thoracic pain in one person with control	P = 0.68	⟷	Not significant

No data from the following reference on this outcome. [17] [19] [21]

Epidural corticosteroid plus conservative non-operative treatment versus conservative treatment alone:
We found one RCT. [22]

Pain

Epidural corticosteroids plus conservative non-operative treatment compared with conservative treatment only
Epidural corticosteroids plus conservative non-operative treatment may be no more effective at 6 weeks and 6 months at improving pain scores in people with disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[22] RCT	36 people with disc herniation confirmed by MRI	**Pain scores (visual analogue scale: 0 = no pain, 100 = most pain possible) , 6 months** 32.9 (range 0–85) with epidural corticosteroid plus conservative non-operative treatment 39.2 (range 0–100) with conservative treatment alone The corticosteroid group received three injections of methylprednisolone 100 mg in 10 mL bupivacaine 0.25% during the first 14 days in hospital Conservative treatment involved initial bed rest and analgesia followed by graded rehabilitation (including hydrotherapy, electroanalgesia, and postural exercise classes) followed by physiotherapy	P = 0.18 The RCT also found no significant difference at 6 weeks	⟷	Not significant

Functional improvement

Epidural corticosteroids plus conservative non-operative treatment compared with conservative treatment only
Epidural corticosteroids plus conservative non-operative treatment may be no more effective at 6 months at improving mobility scores in people with disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[22] RCT	36 people with disc herniation confirmed by MRI	**Hannover Functional Ability Questionnaire from 0% (lowest mobility) to 100% (highest mobility) , 6 months** 61.8 (range 25–83) with epidural corticosteroid plus conservative non-operative treatment 57.2 (range 17–83) with conservative treatment alone The corticosteroid group received three injections of methylprednisolone 100 mg in 10 mL bupivacaine 0.25% during the first 14 days in hospital Conservative treatment involved initial bed rest and analgesia followed by graded rehabilitation (including hydrotherapy, electroanalgesia, and postural exercise classes) followed by physiotherapy	P = 0.15	⟷	Not significant
[22] RCT	36 people with disc herniation confirmed by MRI	**People returning to work , 6 months** 15/17 (88%) with epidural corticosteroid plus conservative non-operative treatment 14/19 (74%) with conservative treatment alone The corticosteroid group received three injections of methylprednisolone 100 mg in 10 mL bupivacaine 0.25% during the first 14 days in hospital Conservative treatment involved initial bed rest and analgesia followed by graded rehabilitation (including hydrotherapy, electroanalgesia, and postural exercise classes) followed by physiotherapy	RR 1.19 95% CI 0.75 to 1.33	⟷	Not significant

Need for surgery

Epidural corticosteroids plus conservative non-operative treatment compared with conservative treatment only

Epidural corticosteroids plus conservative non-operative treatment may be no more effective at 6 months at reducing the need for surgery (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for surgery					
[22] RCT	36 people with disc herniation confirmed by MRI	**Proportion of people needing back surgery , 6 months** 2/17 (12%) with epidural corticosteroid plus conservative non-operative treatment 4/19 (21%) with conservative treatment alone The corticosteroid group received three injections of methylprednisolone 100 mg in 10 mL bupivacaine 0.25% during the first 14 days in hospital	RR 0.56 95% CI 0.09 to 2.17 Contributors' own calculations Reported as not significant by original RCT	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		Conservative treatment involved initial bed rest and analgesia followed by graded rehabilitation (including hydrotherapy, electroanalgesia, and postural exercise classes) followed by physiotherapy			

Adverse effects

No data from the following reference on this outcome. [22]

Epidural corticosteroid injection versus discectomy:

We found one systematic review [23] (search date 2007, 1 RCT [24]) comparing epidural injections versus surgery.

Pain

Compared with standard discectomy Epidural corticosteroid injections may be less effective at 1 to 3 months at improving leg pain in people with lumbar disc herniation (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[24] RCT	100 people with lumbar disc herniation >25% of cross-sectional area of spinal canal, who had 6 weeks of unsuccessful non-invasive treatment (physiotherapy, chiropractic treatment, rest, analgesia, or a combination) In review [23]	**Difference in pain on 11-point visual analogue scale , 1 to 3 months** with epidural corticosteroid injections (betamethasone 10–15 mg, 1 week apart up to 3 times until successful) with discectomy (no further details reported) Absolute results reported graphically	P = 0.001 The difference between treatments was not sustained at 2 to 3 years' follow-up (results presented graphically; see further information on studies below)	○○○	discectomy

Functional improvement

Compared with standard discectomy Epidural corticosteroid injections may be less effective at 1 to 3 months at improving Oswestry Disability Index scores in people with lumbar disc herniation (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[24] RCT	100 people with lumbar disc herniation >25% cross-sectional area of spinal canal, who had 6 weeks of unsuccessful non-invasive treatment (physiotherapy, chiropractic treatment, rest, analge-	**Oswestry Disability Index score , 1 to 3 months** with epidural corticosteroid injections (betamethasone 10–15 mg, 1 week apart up to 3 times until successful) with discectomy (no further details reported) Absolute results reported graphically	P = 0.015 The difference between treatments was not sustained at 2 to 3 years' follow-up (results presented graphically; see further information on studies below)	○○○	discectomy

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
	sia, or a combination) In review [23]				

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[24] RCT	100 people with lumbar disc herniation >25% cross-sectional area of spinal canal, who had 6 weeks of unsuccessful non-invasive treatment (physiotherapy, chiropractic treatment, rest, analgesia, or a combination) In review [23]	**Adverse effects , 1 to 3 months** with epidural corticosteroid injections (betamethasone 10–15 mg, 1 week apart up to 3 times until successful) with discectomy (no further details reported) Absolute results reported graphically	The RCT found that 2/50 (4%) people in the epidural group had an incidental dural puncture, and 3/50 (6%) people had recurrent disc herniation for 2 to 3 years' follow-up period	○○○	discectomy

Further information on studies

[16] The RCT also reported that corticosteroid injections significantly improved subjective limb pain, straight leg raising, lumbar flexion, and patient satisfaction in the short term at 2 weeks, but not after 2 weeks (data not reported).

[17] The additional RCT also reported a significant improvement in straight leg raise at both 4 weeks and 12 months.

[19] This systematic review reports on a double-blinded RCT with 228 participants in which the treatment group received an epidural injection of triamcinolone 80 mg plus 10 mL bupivacaine 0.25% and the placebo group received an epidural injection of normal saline. The RCT found that by 6 weeks the benefits of epidural corticosteroids were lost, and at 52 weeks, improvement in symptoms was 33% in the treatment group and 30% in the placebo group, an improvement that the authors of the systematic review conclude was probably related to the natural course of the disease.

[24] The RCT allowed the 27 people in whom the epidural had failed to improve their symptoms (self-assessment) to receive discectomy. This group was analysed as failures for the epidural corticosteroid injections, and also as a separate subgroup. Two further people in each group who completely crossed over to receive other treatment were analysed according to the intervention they received. There seemed to be multiple hypothesis tests without mention of adjusting the analysis to account for this. Also, no attempt was made to blind the measurement of outcomes. These results should therefore be interpreted with caution.

Comment: None.

OPTION CYTOKINE INHIBITORS

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- Cytokine inhibitors do not seem to improve symptoms of sciatica caused by disc herniation.
- A drug safety alert has been issued by the FDA on the risk of clinically significant liver injury associated with natalizumab.

Benefits and harms

Infliximab versus placebo:

We found one RCT comparing a cytokine inhibitor (infliximab) versus placebo (saline infusion over 2 hours). [25]

Pain

Compared with placebo Infliximab seems no more effective at 12 weeks or 12 months at improving leg or back pain scores in people with sciatic pain caused by herniated disc (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Median reduction in leg pain score (rated on a 100-mm visual analogue scale [VAS], details not reported) , 12 weeks** 43 mm with infliximab (single iv infusion of 5 mg/kg over 2 hours) 50 mm with placebo (saline infusion over 2 hours)	Mean difference –7 mm 95% CI −21 mm to +31 mm P = 0.77	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Median reduction in leg pain score (rated on a 100-mm VAS, details not reported) , 1 year** 38 mm with infliximab (single iv infusion of 5 mg/kg over 2 hours) 44 mm with placebo (saline infusion over 2 hours)	Mean difference –6 mm 95% CI −30 mm to +32 mm P = 0.98	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Median reduction in back pain score (rated on a 100-mm VAS, details not reported) , 12 weeks** 12 mm with infliximab (single iv infusion of 5 mg/kg over 2 hours) 4 mm with placebo (saline infusion over 2 hours)	Mean difference +8 mm 95% CI –19 mm to +16 mm P = 0.93	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Median reduction in back pain score (rated on a 100-mm VAS, details not reported) , 12 months** 13 mm with infliximab (single iv infusion of 5 mg/kg over 2 hours) 17 mm with placebo (saline infusion over 2 hours)	Mean difference –4 mm 95% CI −38 mm to +18 mm P = 0.48	⟷	Not significant

Functional improvement

Compared with placebo Infliximab may be no more effective at 12 weeks or 12 months at reducing disability index scores in people with sciatic pain caused by herniated disc (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Oswestry Disability Index scores , 12 weeks** with infliximab (single iv infusion of 5 mg/kg over 2 hours) with placebo (saline infusion over 2 hours) Absolute results reported graphically	P = 0.37	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Oswestry Disability Index scores , 1 year** 28 with infliximab (single iv infusion of 5 mg/kg over 2 hours) 23 with placebo (saline infusion over 2 hours)	P = 0.48	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Median cumulative sick leave , 12 weeks** 28 days with infliximab (single iv infusion of 5 mg/kg over 2 hours) 25 days with placebo (saline infusion over 2 hours)	P = 0.91	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Median cumulative sick leave , 1 year** 42 days with infliximab (single iv infusion of 5 mg/kg over 2 hours) 25 days with placebo (saline infusion over 2 hours)	P = 0.60	⟷	Not significant

Need for surgery

Compared with placebo Infliximab seems no more effective at 12 weeks or 12 months at reducing the requirement for surgery in people with sciatic pain caused by herniated disc (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Need for surgery					
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Proportion of people having discectomy , 12 weeks** 7/21 (33%) with infliximab (single iv infusion of 5 mg/kg over 2 hours) 7/19 (37%) with placebo (saline infusion over 2 hours)	P = 0.60	⟷	Not significant
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Proportion of people having discectomy , 1 year** 8/21 (38%) with infliximab (single iv infusion of 5 mg/kg over 2 hours) 8/19 (42%) with placebo (saline infusion over 2 hours)	P = 1.0	⟷	Not significant

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[25] RCT	41 people with acute or subacute (2–12 weeks' duration) sciatic pain, caused by herniated disc confirmed by MRI Participants had to be eligible for surgery, and were screened for tuberculosis and other infections	**Adverse effects , 12 weeks** 3/21 (14%) with infliximab (single iv infusion of 5 mg/kg over 2 hours) 0/19 (0%) with placebo (saline infusion over 2 hours) Described as non-serious: rhinitis, diarrhoea, otitis media with sinusitis maxillaris	P = 0.23	⟷	Not significant

Other cytokine inhibitors (adalimumab, etanercept, or natalizumab):

A drug safety alert has been issued by the FDA on the risk of clinically significant liver injury associated with natalizumab (www.fda.gov).

Further information on studies

Comment: One RCT comparing adalimumab versus placebo in people with acute and severe radicular leg pain and imaging-confirmed lumbar disc herniation has been published subsequent to the search date of this *Clinical Evidence* review. [26] We will assess this RCT for inclusion at the next update of this review.

OPTION MUSCLE RELAXANTS

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about muscle relaxants in the treatment of people with symptomatic herniated lumbar disc.

Benefits and harms

Muscle relaxants:

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

Further information on studies

Comment: None.

OPTION NSAIDS

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- NSAIDs do not seem to improve symptoms of sciatica caused by disc herniation.
- A drug safety alert has been issued by the European Medicines Agency (EMEA) on the increased risk of GI adverse effects and serious skin reactions associated with piroxicam.

Benefits and harms

NSAIDs versus placebo:

We found one systematic review (search date 1998, 3 RCTs, 321 people). [15]

Pain

Compared with placebo NSAIDs may be no more effective at improving global pain at 5 to 30 days in people with sciatic pain caused by disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[15] Systematic review	321 people 3 RCTs in this analysis	**Proportion of people with improved pain , 5 to 30 days** 80/172 (47%) with NSAIDs 57/149 (38%) with placebo The NSAIDs used were piroxicam 40 mg daily for 2 days or 20 mg daily for 12 days; indometacin (indomethacin) 75 mg to 100 mg three times daily; phenylbutazone 1200 mg daily for 3 days or 600 mg daily for 2 days	OR for global improvement 0.99 95% CI 0.60 to 1.70	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		Relevance of outcomes assessed unclear — see further information on studies			

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[15] Systematic review	321 people 3 RCTs in this analysis	**Adverse effects** with NSAIDs with placebo The review reported no adverse effects with NSAIDs; however, NSAIDs are associated with well-documented adverse effects. See comment below for further details			

NSAIDs versus electroacupuncture:

We found one small RCT (40 people with sciatica for >2 years caused by disc herniation; verified by MRI, CT scan, or x-ray; see comment below) comparing an NSAID (diclofenac 50 mg 3 times/day) versus electroacupuncture (electrical stimulator [G6805-II] for 25 minutes/day for 7 days). [27]

Pain

Compared with electroacupuncture We don't know how NSAIDs compare with electroacupuncture at improving pain (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain after treatment					
[27] RCT	40 people with sciatica for >2 years caused by disc herniation; verified by MRI, CT, or x-ray Weak methods, see further information on studies	**Mean angle of Lasègue's sign during straight leg raising test , end of treatment** 70.8° with diclofenac 50 mg three times daily 76.7° with electroacupuncture (electrical stimulator [G6805-II] for 25 minutes/day for 7 days)	Mean difference 5.8° 95% CI 4.6° to 7.0° P <0.05	○○○	electroacupuncture
[27] RCT	40 people with sciatica for >2 years caused by disc herniation; verified by MRI, CT, or x-ray Weak methods, see further information on studies	**Buttock tenderness visual analogue scale (VAS) (0 = no tenderness to 10 = extreme tenderness, converted to a scale of 0–100) , end of treatment** 33.3 with diclofenac 50 mg three times daily 25.7 with electroacupuncture (electrical stimulator [G6805-II] for 25 minutes/day for 7 days)	Mean difference –7.6 95% CI –9.3 to –6.0 P <0.05	○○○	electroacupuncture
[27] RCT	40 people with sciatica for >2 years caused by disc	**Leg tenderness VAS (0 = no tenderness to 10 = extreme tenderness, converted to a**	P >0.05	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
	herniation; verified by MRI, CT, or x-ray Weak methods, see further information on studies	**scale of 0–100) , end of treatment** 25.3 with diclofenac 50 mg three times daily 21.0 with electroacupuncture (electrical stimulator [G6805-II] for 25 minutes/day for 7 days)			
[27] RCT	40 people with sciatica for >2 years caused by disc herniation; verified by MRI, CT, or x-ray Weak methods, see further information on studies	**Tenderness in posterior side of the thigh VAS (0 = no tenderness to 10 = extreme tenderness, converted to a scale of 0–100) , at end of treatment** 28.6 with diclofenac 50 mg three times daily 21.2 with electroacupuncture (electrical stimulator [G6805-II] for 25 minutes/day for 7 days)	P >0.05	⟷	Not significant

Functional improvement

Compared with electroacupuncture NSAIDs may be less effective at improving straight leg raising in people with sciatica caused by disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[27] RCT	40 people with sciatica for >2 years caused by disc herniation; verified by MRI, CT, or x-ray Weak methods, see further information on studies	**Mean angle of Lasègue's sign during straight leg raising test , at end of treatment** 70.8° with diclofenac 50 mg three times daily 76.7° with electroacupuncture (electrical stimulator [G6805-II] for 25 minutes/day for 7 days)	Mean difference 5.8° 95% CI 4.6° to 7.0° P <0.05	○○○	electroacupuncture

Adverse effects

No data from the following reference on this outcome. [27]

Further information on studies

[15] The absolute data 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.

[27] The RCT comparing diclofenac versus electroacupuncture may have included people without a conclusive diagnosis of disc herniation, as x-ray was used for diagnosis in some cases. The outcome measures used in this RCT, such as buttock tenderness, may not be comparable to more commonly reported pain measures. The method of randomisation was not reported.

Comment: **Adverse effects of NSAIDs:**
NSAIDs may cause GI, cardiovascular, and other complications (see review on NSAIDs). COX-2 inhibitors have been particularly associated with an increased risk of cardiovascular events, leading to the withdrawal of rofecoxib in September 2004. [28] [29] A drug safety alert has been issued by the European Medicines Agency (EMEA) on the increased risk of GI adverse effects and serious skin reactions associated with piroxicam (www.emea.europa.eu).

QUESTION What are the effects of non-drug treatments for herniated lumbar disc?

OPTION SPINAL MANIPULATION

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- With regard to non-drug treatments, spinal manipulation seems more effective at relieving local or radiating pain in people with acute back pain and sciatica with disc protrusion compared with sham manipulation, although concerns exist regarding possible further herniation from spinal manipulation in people who are surgical candidates.

Benefits and harms

Spinal manipulation versus placebo or sham treatment:

We found one systematic review (search date 2006) [30] and one subsequent RCT. [31] The review identified no RCTs comparing spinal manipulation versus placebo. The subsequent RCT compared active spinal manipulation (assessment of range of motion, soft tissue manipulations, and brisk rotational thrusting) versus sham manipulation (soft muscle pressing and no rapid thrusts). [31] We also found three subsequent systematic reviews evaluating adverse effects. [32] [33] [34]

Pain

Compared with sham manipulation Active spinal manipulation is more effective at 6 months at relieving local or radiating pain in people with acute back pain and sciatica with disc protrusion (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[31] RCT	102 people with acute back pain (pain <10 days and pain-free for the previous 3 months) and sciatica with disc protrusion	**Proportion of people who were free of local or radiating pain (visual analogue scale [VAS] score = 0 on scale where 0 = no pain to 10 = unbearable pain) , 6 months** 15/53 (28%) with active manipulation 3/49 (6%) with sham manipulation	P <0.005	○○○	active manipulation
[31] RCT	102 people with acute back pain (pain <10 days and pain-free for the previous 3 months) and sciatica with disc protrusion	**Proportion of people who were free of radiating pain (VAS score = 0 on scale where 0 = no pain to 10 = unbearable pain) , 6 months** 29/53 (55%) with active manipulation 10/49 (20%) with sham manipulation	P <0.0001	○○○	active manipulation
[31] RCT	102 people with acute back pain (pain <10 days and pain-free for the previous 3 months) and sciatica with disc protrusion	**Treatment failure (defined as stopping of treatment because of no pain reduction) , 6 months** 1/53 (1.9%) with active manipulation 1/49 (2.0%) with sham manipulation	P value and significance not reported		

Functional improvement

Compared with sham manipulation We don't know whether microdiscectomy is more effective at improving physical function (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[31] RCT	102 people with acute back pain (pain <10 days and pain-free for the previous 3 months) and sciatica with disc protrusion	**Mean score for Short Form (SF)-36 Health Survey, physical functioning domain , 6 months** 67.4 with active manipulation 60.5 with sham manipulation	P value not reported Reported as not significant	⟷	Not significant

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[30] Systematic review	People with herniated lumbar disc (number not reported) Small medical records review identified by systematic review	**Worsening of neurological symptoms** with people receiving spinal manipulation with baseline Absolute results not reported The small review of people with significant worsening of neurological symptoms after spinal manipulation found that some were later given a different diagnosis after an MRI scan. See further information on studies for full details			
[32] Systematic review	135 cases of serious complications after spinal manipulation; published between 1950 and 1980 Review of case reports identified by systematic review	**Serious complications** with people receiving spinal manipulation with baseline Absolute results not reported The frequency of complications 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			
[33] Systematic review	4712 treatments in 1058 people having both cervical and lumbar spinal manipulations Results from largest prospective observational study found by the review	**Adverse effects** with people receiving spinal manipulation with baseline Absolute results not reported The most common serious effects were cerebrovascular accidents, and other adverse effects included local discomfort, headache, tiredness, radiating discomfort, dizziness, nausea, and hot skin. However, the authors of the review advise interpreting the results with caution because of unreliable assumptions made. See			

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		further information on studies for full details			
[34] Systematic review	People with herniated disc (number not reported) Data from 8 reviews, 9 prospective/retrospective studies, and 2 cross-sectional surveys identified by the systematic review	**Further disc herniation or cauda equina syndrome** with people receiving spinal manipulation with baseline Absolute results not reported The review estimated that the risk of causing further disc herniation or cauda equina syndrome by spinal manipulation in people in the US is 1 in 3.7 million manipulations. However, this estimate is prone to error. See further information on studies for full details			

No data from the following reference on this outcome. [31]

Spinal manipulation versus heat treatment:

We found one systematic review (search date 2006, 1 RCT). [30]

Patient perception of improvement

Compared with heat treatment Spinal manipulation may be more effective than three sessions of infrared heat treatment a week at increasing overall self-perceived improvement at 2 weeks in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[30] RCT	233 people, 132 people randomised to manipulation and 101 people randomised to heat Data from 1 RCT	**Self-perceived improvement , 2 weeks** 98/123 (80%) with spinal manipulation (by a physiotherapist, every day if necessary; total number of sessions not reported) 56/84 (67%) with infrared heat (3 times weekly)	P value not reported Reported as significant The RCT provided weak evidence that manipulation may be effective in the short term because of methodological limitations (see further information on studies below)	○○○	spinal manipulation

Adverse effects

No data from the following reference on this outcome. [30]

Spinal manipulation versus exercise therapy:

We identified one systematic review (search date 2006, see comment below) that identified one methodologically weak RCT. [30]

Pain

Compared with exercise therapy We don't know whether spinal manipulation is more effective at 1 month or at 3 to 4 months at improving pain scores in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[30] Systematic review **4-armed trial**	322 people Data from 1 RCT	**Pain scores , 28 days and at 3 to 4 months** with spinal manipulation with exercise therapy with manual traction with corsets Absolute results not reported	Reported no significant difference among groups (interventions compared using a factorial design) P value not reported The RCT had weak methods; see further information on studies	⟷	Not significant

Patient perception of improvement

Compared with exercise therapy We don't know whether spinal manipulation is more effective at 1 month or at 3 to 4 months at increasing overall self-perceived improvement in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[30] Systematic review **4-armed trial**	322 people Data from 1 RCT	**Self-perceived improvement , 28 days and at 3 to 4 months** with spinal manipulation with exercise therapy with manual traction with corsets Absolute results not reported	Reported no significant difference among groups (interventions compared using a factorial design) P value not reported The RCT had weak methods; see further information on studies	⟷	Not significant

Adverse effects

No data from the following reference on this outcome. [30]

Spinal manipulation versus traction:

We identified one systematic review (search date 2006, 2 RCTs). [30]

Patient perception of improvement

Compared with traction We don't know whether spinal manipulation is more effective at 1 month at increasing overall self-perceived improvement in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[30] Systematic review **4-armed trial**	322 people Data from 1 RCT The remaining arms evaluated exercise therapy and corsets	**Self-perceived improvement , 28 days** with spinal manipulation with manual traction Absolute results not reported	Reported no significant difference between spinal manipulation and manual traction (interventions compared using a factorial design) P value not reported	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
			The RCT had weak methods; see further information on studies		

Functional improvement

Compared with traction Spinal manipulation may be more effective at improving lumbar function and straight leg raising in people with herniated lumbar disc (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[35] RCT	112 people with symptomatic herniated lumbar disc In review [30]	**Proportion of people "improved" or "cured" , timescale not reported** 54/62 (87%) with pulling and turning manipulation 33/50 (66%) with traction "Improved" was defined as absence of lumbar pain, improvement in lumbar functional movement; "cured" was defined as absence of lumbar pain, straight leg raising of >70°, ability to return to work	P <0.05	○○○	spinal manipulation

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[35] RCT	112 people with symptomatic herniated lumbar disc In review [30]	**Syncope , timescale not reported** with pulling and turning manipulation with traction The RCT found that 2/60 (3%) people receiving traction had syncope; no adverse effects were reported in people receiving manipulation			

Further information on studies

[31] **Spinal manipulation versus placebo or sham treatment:** Both groups were treated according to a pre-planned 30-day protocol of up to 20 sessions lasting 5 minutes on 5 days a week by experienced chiropractors with the same formal training. Pain scores were assessed using a 10-cm visual analogue scale (VAS; 0 = no pain to 10 = unbearable pain). The review [30] identified one systematic review of adverse effects, [34] and a small retrospective medical record review of 18 people reporting significant worsening of neurological symptoms immediately after spinal manipulation by different chiropractors in New York State. [36] Although people were not scanned before treatment, 12 people had disc herniation (8 of whom had lumbar disc herniation) when scanned by MRI or CT after the adverse event occurred. Two people had symptoms at the site of the manipulation who had originally presented symptoms elsewhere. The author of the review suggested that imaging should be carried out before manipulation to avoid worsening any existing significant disc herniation. However, this was a small medical record review, and does not state how many people in total received spinal manipulation.

[33] The largest study identified by 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 serious effects were cerebrovascular accidents (total proportion of people having manipulations not reported, rate of adverse effects cannot be estimated). However, it is difficult to assess whether such events are directly related to treatment. The percentages included both cervical and lumbar spinal manipulations, which may overestimate the effect of lumbar spinal manipulations. The authors of the review advise caution in interpreting these results, as they are speculative and based on assumptions about the number of manipulations performed and of unreported cases.

[34] The estimates calculated were based on rough estimates in the literature (best available) using what the author thought to be the most accurate, recent, or conservative values. This estimate is also prone to error because of 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.

[30] **Spinal manipulation versus heat treatment:** The review commented that the identified RCT provided weak evidence, because it did not report method of randomisation, group baseline characteristics, whether the control group received the same number of treatments as the other group, what happened to those lost to follow-up at 2 weeks (9/132 [7%] with spinal manipulation *v* 22/123 [18%] with heat), or whether it used intention-to-treat analysis.

[30] **Spinal manipulation versus exercise therapy or traction:** The review commented on the methodological weaknesses of the 4-armed RCT, which did not describe the method of randomisation, and was not single-blinded. It gave insufficient detail about baseline characteristics for groups at baseline, and may have included people without herniated disc.

Comment: We found one further trial on manipulative reduction that was written in Chinese. [37] We are currently awaiting full text translation and we will assess this for inclusion in our next update.

OPTION ACUPUNCTURE

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found insufficient evidence about acupuncture to judge its efficacy in treating people with herniated disc.

Benefits and harms

Acupuncture versus sham acupuncture:

We found one systematic review (search date 1998) [38] in people with back and neck pain, which identified one small RCT of acupuncture in people with sciatica.

Pain

Compared with sham acupuncture We don't know whether acupuncture is more effective at reducing pain intensity at rest in people with acute sciatica caused by disc herniation (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[38] Systematic review	30 people with acute sciatica Data from 1 RCT	**Pain intensity at rest , 5 days** with acupuncture at electronically detected non-traditional points with sham acupuncture	The RCT found that acupuncture significantly improved three outcomes compared with sham acupuncture, and that there was an overall benefit of acupuncture. However, the review disagreed with the overall beneficial conclusion of the RCT, only finding a significant difference between groups in 3/12 (25%) outcome measures, and no significant dif-	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
			ference 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)		

Adverse effects

No data from the following reference on this outcome. [38]

Laser acupuncture versus sham laser acupuncture:

We found one systematic review (search date 1998) [38] in people with back and neck pain, which identified one small crossover RCT of laser acupuncture at traditional points versus sham laser acupuncture.

Pain

Compared with sham laser acupuncture We don't know whether laser acupuncture is more effective at reducing pain intensity in people with radicular and pseudo-radicular cervical and lumbar pain caused by stenosis, herniated disc, or both (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[38] Systematic review **Crossover design**	42 people, radicular and pseudo-radicular cervical and lumbar pain caused by stenosis, herniated disc, or both Data from 1 RCT The sample size was small, and it is unclear whether the data are generalisable to herniated disc	**Reduction of pain intensity , after 24 hours** with laser acupuncture at traditional points with 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 sham laser acupuncture	⟷	Not significant

Adverse effects

No data from the following reference on this outcome. [38]

Electroacupuncture versus NSAIDs:

See option on NSAIDs, p 17 .

Adding acupuncture to manipulation compared with manipulation alone:

We found one RCT comparing acupuncture plus manipulation versus manipulation alone. [39]

Pain

Adding acupuncture to manipulation compared with manipulation alone Adding acupuncture to manipulation may be more effective at improving pain in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[39] RCT	58 people with diagnosed herniated lumbar disc confirmed by imaging (details not reported); duration of illness 24 days to 10 years	**Change in pain from baseline (visual analogue scale: 0 = no pain, 10 = unbearable severe pain) , evaluated after 20 sessions (time not reported)** from 4.98 to 0.83 with acupuncture plus manipulation from 4.77 to 2.85 with manipulation alone See further information on studies for full details of the interventions used The randomisation procedure used in this study was not clear	P <0.01	○○○	acupuncture plus manipulation
[39] RCT	58 people with diagnosed herniated lumbar disc confirmed by imaging (details not reported); duration of illness 24 days to 10 years	**Recovery rate (the proportion of people with 100% improvement according to the Japanese Orthopaedic Association Lumbar Vertebral Disease Therapy Scale) , evaluated after 20 sessions (time not reported)** 7/30 (23%) with acupuncture plus manipulation 3/28 (11%) with manipulation alone See further information on studies for full details of the interventions used The randomisation procedure used in this study was not clear	P <0.05	○○○	acupuncture plus manipulation
[39] RCT	58 people with diagnosed herniated lumbar disc confirmed by imaging (details not reported); duration of illness 24 days to 10 years	**Overall effectiveness (the proportion of people with improvements of >25% according to the Japanese Orthopaedic Association Lumbar Vertebral Disease Therapy Scale) , evaluated after 20 sessions (time not reported)** 7/30 (23%) with acupuncture plus manipulation 3/28 (11%) with manipulation alone See further information on studies for full details of the interventions used The randomisation procedure used in this study was not clear	P <0.05	○○○	acupuncture plus manipulation

Adverse effects

No data from the following reference on this outcome. [39]

Further information on studies

[39] Acupoints and technique of acupuncture were selected depending on the location of pain, level of pain, and duration of symptoms, and involved 30 minutes' treatment daily for 2 courses of 10 sessions, with 3 to 5 days' gap between courses. Manipulation involved 20 minutes each session of forcible thrusting, pinching, grasping, rolling, and pulling of the lower back and legs, pressing acupoints, relaxing muscles, followed by passive exercises of low back and legs and oblique pulling of the low back.

Comment: None.

OPTION ADVICE TO STAY ACTIVE

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about advice to stay active in the treatment of people with sciatica caused by lumbar disc herniation.

Benefits and harms

Advice to stay active:

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. [15] We found no subsequent RCTs.

Further information on studies

Comment: None.

OPTION EXERCISE THERAPY

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found insufficient evidence about exercise to judge its efficacy in treating people with herniated disc.

Benefits and harms

Exercise therapy versus placebo or no treatment:

We found one systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation. [15] It found no RCTs comparing exercise therapy versus no treatment or placebo. We found no subsequent RCTs.

Exercise therapy versus spinal manipulation:

See option on spinal manipulation, p 20 .

Exercise therapy versus traction:

We found two systematic reviews (search dates 1998 [40] and 2006 [30]), each of which identified a different RCT.

Pain

Compared with traction We don't know whether exercise therapy is more effective than isometric exercises at achieving global improvement in pain at 1 month in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Global improvement scores					
[40] Systematic review	50 people admitted for possible surgery for herniated lumbar disc, verified by myelogram Data from 1 RCT	**Pain free or improved** 10/26 (38%) with isometric exercise 10/24 (42%) with manual traction See further information on studies for full details of interventions and outcomes	Reported as not significant	⟷	Not significant
[30] Systematic review **4-armed trial**	322 people Data from 1 RCT	**Overall self-perceived improvement, pain scores or return to work , after 28 days and at 3 to 4 months** with exercise therapy with manual traction with spinal manipulation with corsets Absolute results not reported Weak methods; see further information on studies for full details	Reported as not significant P value not reported	⟷	Not significant

Adding exercise plus education to conventional non-surgical treatment versus conventional non-surgical treatment alone:

We found one RCT (40 people with invertebral disc herniation) comparing exercise plus education plus conventional non-surgical treatment versus conventional non-surgical treatment alone. [41]

Functional improvement

Adding exercise plus education to conventional non-surgical treatment compared with conventional non-surgical treatment alone We don't know whether adding exercise and education to conventional non-surgical treatment is more effective at 6 months to 3 years at improving lumbodorsal function or decreasing recurrences in people with invertebral disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[41] RCT	40 people with invertebral disc herniation	**Proportion of people in both groups with improvement in lumbodorsal function , 6 months** with exercise plus education plus conventional non-surgical treatment with conventional non-surgical treatment alone	P <0.01 Weak methods; see further information on studies	○○○	exercise plus education
[41] RCT	40 people with invertebral disc herniation	**People with "excellent" or "good" efficacy (assessed using the modified Macnab criteria) , 3 years**	P <0.01 Weak methods; see further information on studies	○○○	exercise plus education

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		17/20 (85%) with exercise plus education plus conventional non-surgical treatment 11/20 (55%) with conventional non-surgical treatment alone			
[41] RCT	40 people with invertebral disc herniation	**Recurrence , 3 years** 4/20 (20%) with exercise plus education plus conventional non-surgical treatment 11/20 (55%) with conventional non-surgical treatment alone	P <0.01 Weak methods; see further information on studies	○○○	exercise plus education

Adverse effects

No data from the following reference on this outcome. [41]

Further information on studies

[40] Isometric exercises were done for 20 minutes daily for 5 to 7 days; abdominal, back, hip, and thigh muscle contractions held for 6 to 8 seconds, repeated 5 to 10 times for each muscle group in crook and side-lying, and supine positions. Manual traction involved 10 minutes of static traction daily for 5 to 7 days at a force of 300 N. The global measure of improvement used in the RCT comparing exercise versus traction was assessed by a neurologist (blind to intervention received), based on a 4-point scale that ranged from "symptom free" to "unchanged". An improvement was considered as: 15 cm or greater increase in straight leg raising test; 2 cm or greater increase in range of movement of lumbar spine in sagittal plane; 25% or greater 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). Only short-term outcomes were measured — long-term effectiveness was not evaluated.

[30] The review commented on the methodological weaknesses of the 4-arm RCT, which did not describe the method of randomisation, and was not single blinded. It gave insufficient detail about baseline characteristics for groups at baseline, and may have included people without herniated disc.

[41] The authors of the RCT reported a significant difference between the groups in self-assessed function at 6 months, but when these differences were recalculated by the contributor for this *Clinical Evidence* review, they were not significant. Exercise involved dorsal muscle strengthening with self-massage of the lumbar region and hands (frequency not reported). Education involved rehabilitation education (knowledge and understanding about the condition, psychological rehabilitation (dispelling adverse moods, adjusting patient's psychology, and strengthening their resolve and confidence in recovery), and education on preventive methods (advice on posture and activities). Conventional non-surgical treatment was not defined.

Comment: None.

OPTION HEAT

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found insufficient RCT evidence about heat to judge its efficacy in treating people with herniated disc.

Benefits and harms

Heat versus placebo or no treatment:

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 for herniated lumbar disc. [15] We found no subsequent RCTs.

Heat versus spinal manipulation:

See option on spinal manipulation, p 20 .

Further information on studies

Comment: None.

OPTION ICE

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about ice in the treatment of people with sciatica caused by lumbar disc herniation.

Benefits and harms

Ice compared with no ice:

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 ice for herniated lumbar disc. [15] We found no subsequent RCTs.

Further information on studies

Comment: None.

OPTION MASSAGE

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found insufficient information from RCTs to assess the effects of massage in people with herniated lumbar disc.

Benefits and harms

Massage versus no massage:

We found one systematic review (search date 1998) of conservative treatments for sciatica caused by disc herniation, which found no RCTs of massage. [15]

Massage/manipulation versus massage/manipulation plus functional training exercises versus traction:

We found one RCT that was a three-arm trial comparing massage/manipulation versus massage/manipulation plus functional training exercises versus traction. [42]

Pain

Massage/manipulation compared with massage/manipulation plus functional training exercises We don't know whether massage/manipulation is more effective at improving lumbar pain in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[42] RCT **3-armed trial**	110 people The remaining arm evaluated traction	**"Significant efficacy" (defined as cure or >60% improvement from baseline in lumbar pain and function)** 39/55 (71%) with massage/manipulation 39/55 (71%) with massage/manipulation plus functional training exercises	Reported as not significant for massage/manipulation *v* massage/manipulation plus functional training exercises	⟷	Not significant

Adverse effects

No data from the following reference on this outcome. [42]

Massage/manipulation versus traction:

We found one RCT that was a three-arm trial comparing massage/manipulation versus massage/manipulation plus functional training exercises versus traction. [42]

Pain

Massage/manipulation compared with traction Massage/manipulation may be more effective at improving outcomes in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[42] RCT **3-armed trial**	110 people The remaining arm evaluated massage/manipulation plus functional training exercises	**"Significant efficacy" (defined as cure or >60% improvement from baseline in lumbar pain and function)** 39/55 (71%) with massage/manipulation 24/55 (44%) with traction	P >0.05 for massage/manipulation *v* traction	⟷	Not significant

Adverse effects

No data from the following reference on this outcome. [42]

Further information on studies

[42] Massage/manipulation involved 20-minute sessions, three times weekly, for a total of 20 sessions of waist-rolling massage and passive backward stretching, lumbar manual vertebral mobilisation, rotational manipulation, passive hip extension while lying prone, pressure correction, improved lumbar vertebrae inclined turning, prone lying and active backward stretching, forced leg raising, and remedial manipulation. Massage/manipulation plus functional training was as above, plus exercises of the lumbar and abdominal muscles, including stretching and strengthening exercises for the back and legs, for 20 to 30 minutes, three times weekly before going to sleep. People receiving traction had 20 minutes daily for a total of 20 treatments using a TF-4 computerised traction bed, starting at half of body weight and increasing to full body weight.

Comment: Although the intervention used in the RCT was called massage, it included spinal manipulation techniques. [42] Therefore, the results may not be comparable with other massage-only interventions.

OPTION BED REST

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- Bed rest does not seem effective in treating people with sciatica caused by disc herniation.

Benefits and harms

Bed rest versus no treatment (watchful waiting):

We found one systematic review [15] and one subsequent RCT. [43] The systematic review (search date 1998) identified no RCTs of bed rest for treatment of people with symptomatic herniated disc. [15]

Pain

Compared with no treatment Bed rest may be no more effective than watchful waiting at improving pain scores at 12 weeks in people with sciatica (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[43] RCT	183 people with sciatica, intensity sufficient to justify 2 weeks of bed rest as treatment Most people had nerve root compression on MRI (109/161 [68%] people who had MRI performed)	**Mean pain scores (McGill Pain Questionnaire) , 12 weeks** 8 with bed rest at home (instructed to stay in the supine or lateral recumbent position with 1 pillow under the head) 7 with watchful waiting	Difference –0.6 95% CI –3.3 to +2.1 Based on regression analysis	⟷	Not significant

Functional improvement

Compared with no treatment Bed rest may be no more effective than watchful waiting at improving disability scores at 12 weeks in people with sciatica (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[43] RCT	183 people with sciatica, intensity sufficient to justify 2 weeks of bed rest as treatment Most people had nerve root compres-	**Revised Roland Morris Disability Questionnaire , 12 weeks** 15.2 with bed rest at home (instructed to stay in the supine or lateral recumbent position with 1 pillow under the head)	Difference –0.5 95% CI –2.6 to +1.6	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
	sion on MRI (109/161 [68%] people who had MRI performed)	15.7 with watchful waiting			

Patient perception of improvement

Compared with no treatment Bed rest may be no more effective than watchful waiting at improving people's perception of improvement at 12 weeks in people with sciatica (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[43] RCT	183 people with sciatica, intensity sufficient to justify 2 weeks of bed rest as treatment Most people had nerve root compression on MRI (109/161 [68%] people who had MRI performed)	**Mean satisfaction scores , 12 weeks** 7 with bed rest at home (instructed to stay in the supine or lateral recumbent position with 1 pillow under the head) 8 with watchful waiting	Difference –0.1 95% CI –0.6 to +0.3 Based on regression analysis	⟷	Not significant

Adverse effects

No data from the following reference on this outcome. [15] [43]

Further information on studies

[43] 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.

Comment: We found one further systematic review (search date 1996) of bed rest and advice to stay active in people with acute low back pain, which found three RCTs including people with sciatica or radiating pain. [44] However, no further details were given on the proportion of people in these RCTs with herniated disc. The review concluded that there was little evidence on bed rest specifically for herniated lumbar disc, although the RCTs identified questioned the efficacy of bed rest for sciatica. [44]

OPTION TRACTION

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- Traction does not seem effective in treating people with sciatica caused by disc herniation.

Benefits and harms

Traction versus no traction or sham traction:

We found one systematic review (search date 1998) [15] and one subsequent RCT. [45]

Pain

Traction compared with no traction or sham traction Traction may be no more effective at achieving overall global improvement or pain intensity in people with sciatica caused by lumbar disc herniation (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[15] Systematic review	329 people with sciatica who may or may not have had disc herniation 4 RCTs in this analysis	**Global improvement** with traction with no traction or sham traction Absolute results not reported See further information on studies for full details of interventions Global improvement included pain intensity, mobility of lumbar spine, straight leg raising test, and function	OR 1.2 95% CI 0.7 to 2.0	⟷	Not significant

No data from the following reference on this outcome. [45]

Functional improvement

Manual traction compared with no traction or sham traction We don't know whether manual traction is more effective at increasing Oswestry Disability Index scores in people with herniated disc (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[45] RCT	102 people with herniated disc diagnosed by clinical examination or MRI	**Mean changes from baseline Oswestry Disability Index scores** 19.25 with manual traction 25.25 with sham traction See further information on studies for details of interventions used	Mean difference +6.00 95% CI –0.42 to +12.43 P = 0.067	⟷	Not significant

No data from the following reference on this outcome. [15]

Patient perception of improvement

Manual traction compared with no traction or sham traction We don't know whether manual traction is more effective at increasing the number of people reporting complete recovery or much improvement in people with herniated disc (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[45]	102 people with herniated disc diagnosed by clinical examination or MRI	**Proportion of people reporting a complete recovery or much improvement** 38/54 (70%) with manual traction 34/48 (71%) with sham traction See further information on studies for details of interventions used	P = 0.889	⟷	Not significant

Traction versus exercise therapy:

See exercise therapy, p 28 .

Traction versus spinal manipulation:

See spinal manipulation, p 20 .

Traction versus massage:

See massage, p 31 .

Autotraction versus passive traction:

The review [15] identified two RCTs [46] [47] comparing autotraction versus passive traction.

Functional improvement

Autotraction compared with passive traction We don't know whether autotraction is more effective at achieving overall global improvement (based on Lasègue's sign, functional ability, and patient's opinion) or at increasing response rates immediately after treatment in people with herniated lumbar disc (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Functional improvement					
[46] RCT	49 hospitalised people with confirmed herniated disc In review [15]	**Global assessment by neurologist: AR for "no effect" , 2 weeks** 21/26 (81%) with autotraction 16/23 (70%) with manual traction See further information on studies for details of interventions used. Global assessment based on Lasègue's sign, functional ability, and patient's opinion	Results at 3 months were the same as for 2 weeks P values and CIs not reported	⟷	Not significant
[47] RCT	44 people with herniated disc verified by CT scan or MRI In review [15]	**Proportion of people who classified themselves as responders , immediately after treatment** 17/22 (77%) with 3 sessions of autotraction 4/22 (18%) with 5 sessions of passive traction See further information on studies for details of interventions used. 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	P <0.001	○○○	autotraction

Adverse effects

No data from the following reference on this outcome. [15] [46] [47]

Further information on studies

[15] The RCTs identified by the review comparing traction versus placebo used a variety of traction techniques and placebo treatments (comparisons: continuous traction, about 45 kg for 30 minutes/day for up to 3 weeks *v* infrared heat three 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) [48] identified all 4 placebo-controlled RCTs identified in the later review, [15] but considered two of these RCTs in acute low back pain rather than herniated lumbar disc. Neither of the RCTs considered to be in people with lumbar disc herniation by both systematic reviews found any significant differences between traction and placebo.

[45] The RCT compared manual traction (20 minutes, 3 times weekly: intermittent hold for 45 seconds, rest for 30 seconds, 90° hip flexion and 90° knee flexion, therapist applied force of 35–50% of body weight) versus sham traction (same as manual traction, but therapist applying <20% of body weight). People in both groups also received NSAIDs, an advice booklet on appropriate activities for back protection and back exercises, and application of superficial heat to the back at home.

[46] The RCT compared autotraction (using the Lind technique; held from a few seconds up to a couple of minutes with force between a third to 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).

[47] The RCT compared three sessions of autotraction (Natchev technique with specially designed traction table) versus 5 sessions of passive traction (static traction held by chain to table of 35% of body weight; 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".

Comment: We also found a study on electroacupuncture under continuous traction, which was written in Chinese. [49] We are currently awaiting full text translation and we will assess this for inclusion in our next update.

QUESTION What are the effects of surgery for herniated lumbar disc?

OPTION MICRODISCECTOMY

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- Microdiscectomy and standard discectomy seem to increase self-reported improvement to a similar extent.

Benefits and harms

Microdiscectomy versus conservative treatment:

We found two RCTs comparing microdiscectomy with conservative treatment. [50] [51]

Pain

Compared with conservative treatment Microdiscectomy may be more effective at reducing leg pain intensity at 8 weeks, but may be no more effective at reducing leg or back pain after 6 months to 2 years (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Leg pain					
[50] RCT	56 people	**Leg pain, measured on a 100-mm visual analogue scale (VAS) from 0 = no pain to 100 = worst possible pain , baseline**	Reported as not significant	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		61 with microdiscectomy plus physiotherapeutic instructions 57 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)			
[50] RCT	56 people	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 6 weeks** 12 with microdiscectomy plus physiotherapeutic instructions 25 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	P <0.01	○○○	microdiscectomy
[50] RCT	56 people	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 3 months** 9 with microdiscectomy plus physiotherapeutic instructions 16 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 6 months** 9 with microdiscectomy plus physiotherapeutic instructions 18 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 1 year** 6 with microdiscectomy plus physiotherapeutic instructions 9 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 2 years** 6 with microdiscectomy plus physiotherapeutic instructions 15 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , baseline** 67.2 with early microdiscectomy (scheduled within 2 weeks of randomisation) 64.4 with conservative care For full details about interventions used, see further information on studies	Reported as not significant	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 8 weeks** 10.2 with early microdiscectomy (scheduled within 2 weeks of randomisation) 27.9 with conservative care For full details about interventions used, see further information on studies	Difference 17.7 95% CI 12.3 to 23.1	○○○	early microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 6 months** 8.4 with early microdiscectomy (scheduled within 2 weeks of randomisation) 14.5 with conservative care For full details about interventions used, see further information on studies	Difference 6.1 95% CI 2.2 to 10.0	○○○	early microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 1 year** 11.0 with early microdiscectomy (scheduled within 2 weeks of randomisation) 11.0 with conservative care For full details about interventions used, see further information on studies	Difference 0 95% CI –4.0 to +4.0	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Leg pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 2 years** 11.0 with early microdiscectomy (scheduled within 2 weeks of randomisation) 9.0 with conservative care For full details about interventions used, see further information on studies	Difference –2 95% CI –6.0 to +2.0	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Back pain					
[50] RCT	56 people	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , baseline** 53 with microdiscectomy plus physiotherapeutic instructions 47 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 6 weeks** 21 with microdiscectomy plus physiotherapeutic instructions 28 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 3 months** 15 with microdiscectomy plus physiotherapeutic instructions 22 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 6 months** 13 with microdiscectomy plus physiotherapeutic instructions 20 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 1 year** 19 with microdiscectomy plus physiotherapeutic instructions 17 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 2 years** 11 with microdiscectomy plus physiotherapeutic instructions 21 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , baseline** 33.8 with early microdiscectomy (scheduled within 2 weeks of randomisation) 30.8 with conservative care For full details about interventions used, see further information on studies	Reported as not significant	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 8 weeks** 14.4 with early microdiscectomy (scheduled within 2 weeks of randomisation) 25.7 with conservative care For full details about interventions used, see further information on studies	Difference 11.3 95% CI 5.6 to 17.4	○○○	microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 6 months** 15.5 with early microdiscectomy (scheduled within 2 weeks of randomisation) 17.8 with conservative care For full details about interventions used, see further information on studies	Difference +2.3 95% CI –3.6 to +8.2	○○○	microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 1 year** 14.2 with early microdiscectomy (scheduled within 2 weeks of randomisation) 16.5 with conservative care For full details about interventions used, see further information on studies	Difference +2.3 95% CI –3.6 to +8.2	○○○	microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Back pain, measured on a 100-mm VAS from 0 = no pain to 100 = worst possible pain , 2 years** 15.9 with early microdiscectomy (scheduled within 2 weeks of randomisation) 17.3 with conservative care For full details about interventions used, see further information on studies	Difference +1.4 95% CI –4.5 to +6.3	○○○	Not significant
Short Form-36 bodily pain questionnaire					
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and	**Short Form (SF)-36 bodily pain questionnaire, measured on a scale from 0 to 100; increasing**	Reported as not significant	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
	radiologically confirmed disc herniation	**score indicates less-severe symptoms , baseline** 21.9 with early microdiscectomy (scheduled within 2 weeks of randomisation) 23.9 with conservative care For full details about interventions used, see further information on studies			
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 bodily pain questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 8 weeks** 62.8 with early microdiscectomy (scheduled within 2 weeks of randomisation) 54.4 with conservative care For full details about interventions used, see further information on studies	Difference –8.4 95% CI –13.5 to –3.2	○○○	microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 bodily pain questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 6 months** 76.1 with early microdiscectomy (scheduled within 2 weeks of randomisation) 72.8 with conservative care For full details about interventions used, see further information on studies	Difference –3.3 95% CI –8.4 to +1.8	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 bodily pain questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 1 year** 81.2 with early microdiscectomy (scheduled within 2 weeks of randomisation) 78.5 with conservative care For full details about interventions used, see further information on studies	Difference –2.7 95% CI –7.9 to +2.6	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 bodily pain questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 2 years** 78.4 with early microdiscectomy (scheduled within 2 weeks of randomisation) 80.7 with conservative care For full details about interventions used, see further information on studies	Difference +2.3 95% CI –2.7 to +7.3	⟷	Not significant

Functional improvement

Compared with conservative treatment We don't know whether microdiscectomy is more effective at improving Oswestry Disability index at 6 weeks to 2 years (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Oswestry Low Back Pain Disability Score					
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , baseline** 39 with microdiscectomy plus physiotherapeutic instructions 39 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 6 weeks** 16 with microdiscectomy plus physiotherapeutic instructions 22 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 3 months** 16 with microdiscectomy plus physiotherapeutic instructions 22 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 6 months** 8 with microdiscectomy plus physiotherapeutic instructions 12 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 1 year** 10 with microdiscectomy plus physiotherapeutic instructions 11 with conservative treatment (physiotherapeutic instructions	Reported as not significant	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		plus continued isometric exercises)			
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 2 years** 6 with microdiscectomy plus physiotherapeutic instructions 11 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
Modified Roland disability questionnaire					
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Modified Roland disability questionnaire, measured on a scale of 0 to 23; increasing score indicates worse functional status , baseline** 16.5 with early microdiscectomy (scheduled within 2 weeks of randomisation) 16.3 with conservative care For full details about interventions used, see further information on studies	Reported as not significant	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Modified Roland disability questionnaire, measured on a scale of 0 to 23; increasing score indicates worse functional status , 8 weeks** 6.1 with early microdiscectomy (scheduled within 2 weeks of randomisation) 9.2 with conservative care For full details about interventions used, see further information on studies	Difference 3.1 95% CI 1.7 to 4.3	○○○	microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Modified Roland disability questionnaire, measured on a scale of 0 to 23; increasing score indicates worse functional status , 6 months** 4.0 with early microdiscectomy (scheduled within 2 weeks of randomisation) 4.8 with conservative care For full details about interventions used, see further information on studies	Difference +0.8 95% CI –0.5 to +2.1	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Modified Roland disability questionnaire, measured on a scale of 0 to 23; increasing score indicates worse functional status , 1 year** 3.3 with early microdiscectomy (scheduled within 2 weeks of randomisation) 3.7 with conservative care	Difference +0.4 95% CI –0.9 to +1.7	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		For full details about interventions used, see further information on studies			
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Modified Roland disability questionnaire, measured on a scale of 0 to 23; increasing score indicates worse functional status , 2 years** 3.1 with early microdiscectomy (scheduled within 2 weeks of randomisation) 2.6 with conservative care For full details about interventions used, see further information on studies	Difference +0.5 95% CI –0.8 to +1.8	⟷	Not significant
Short Form-36 physical functioning questionnaire					
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Short Form (SF)-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , baseline** 33.9 with early microdiscectomy (scheduled within 2 weeks of randomisation) 34.6 with conservative care For full details about interventions used, see further information on studies	Reported as not significant	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 6 weeks** 71.2 with early microdiscectomy (scheduled within 2 weeks of randomisation) 61.9 with conservative care For full details about interventions used, see further information on studies	Difference –9.3 95% CI –14.2 to –4.4	○○○	microdiscectomy
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 6 months** 79.1 with early microdiscectomy (scheduled within 2 weeks of randomisation) 77.6 with conservative care For full details about interventions used, see further information on studies	Difference –1.5 95% CI –6.4 to +3.4	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 1 year** 84.2 with early microdiscectomy (scheduled within 2 weeks of randomisation)	Difference –2.2 95% CI –7.2 to +2.8	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		82.0 with conservative care For full details about interventions used, see further information on studies			
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 2 year** 82.3 with early microdiscectomy (scheduled within 2 weeks of randomisation) 83.6 with conservative care For full details about interventions used, see further information on studies	Difference +1.3 95% CI –3.7 to +6.3	⟷	Not significant

Quality of life

Compared with conservative treatment We don't know whether microdiscectomy is more effective at 6 weeks to 2 years at improving quality-of-life scores or the subjective ability to work (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Quality of life					
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , baseline** 0.83 with microdiscectomy plus physiotherapeutic instructions 0.84 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 6 weeks** 0.92 with microdiscectomy plus physiotherapeutic instructions 0.89 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 3 months** 0.94 with microdiscectomy plus physiotherapeutic instructions 0.91 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 6 months** 0.95 with microdiscectomy plus physiotherapeutic instructions 0.90 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 1 year** 0.95 with microdiscectomy plus physiotherapeutic instructions 0.94 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant
[50] RCT	56 people	**Oswestry Low Back Pain Disability Score, measured on a scale of 0 to 100; increasing score indicates greater lower back pain-related disability , 2 years** 0.95 with microdiscectomy plus physiotherapeutic instructions 0.93 with conservative treatment (physiotherapeutic instructions plus continued isometric exercises)	Reported as not significant	⟷	Not significant

No data from the following reference on this outcome. [51]

Patient perception of improvement

Compared with conservative treatment Microdiscectomy may be more effective at improving patients' perceived recovery at 8 weeks but may be no more effective at 6 months to 2 years (very low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Short Form (SF)-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 8 weeks** 81.2 with early microdiscectomy (scheduled within 2 weeks of randomisation) 36.5 with conservative care For full details about interventions used, see further information on studies	Difference 44.7 95% CI 34.2 to 55.0	○○○	microdiscectomy

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 6 months** 77.4 with early microdiscectomy (scheduled within 2 weeks of randomisation) 70.8 with conservative care For full details about interventions used, see further information on studies	Difference +6.6 95% CI –3.7 to +17.0	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 1 year** 85.7 with early microdiscectomy (scheduled within 2 weeks of randomisation) 82.5 with conservative care For full details about interventions used, see further information on studies	Difference +3.2 95% CI –5.4 to +11.9	⟷	Not significant
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**SF-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 2 years** 81.3 with early microdiscectomy (scheduled within 2 weeks of randomisation) 78.9 with conservative care For full details about interventions used, see further information on studies	Difference +2.4 95% CI –7.2 to +12.0	⟷	Not significant

No data from the following reference on this outcome. [50]

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[50] RCT	56 people	**Urosepsis** with microdiscectomy plus physiotherapeutic instructions with conservative treatment (physiotherapeutic instructions plus continued isometric exercises) Absolute results not reported The RCT reported that 1 person (1/28 [4%]) in the microdiscectomy group contracted urosepsis, requiring intravenous antibiotics and a prolonged hospital stay			

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[51] RCT	283 people with 6 to 12 weeks of persistent sciatica and radiologically confirmed disc herniation	**Short Form (SF)-36 physical functioning questionnaire, measured on a scale from 0 to 100; increasing score indicates less-severe symptoms , 8 weeks** with early microdiscectomy (scheduled within 2 weeks of randomisation) with conservative care Absolute results not reported For full details about interventions used, see further information on studies The RCT did not report any data on harms of microdiscectomy versus conservative treatment. It reported complications in 3/187 (2%) of all surgically treated people between the two groups (including 2 dural tears and 1 wound haematoma), none of which required further intervention			

Microdiscectomy versus standard discectomy:

See option on standard discectomy, p 51 .

Video-assisted arthroscopic microdiscectomy versus standard discectomy:

We found one RCT. [52]

Pain

Compared with standard discectomy We don't know how video-assisted arthroscopic microdiscectomy and standard discectomy compare for reducing pain (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[52]	60 people with confirmed lumbar disc herniation and associated radiculopathy after failed conservative treatment	**Mean pain score (visual analogue scale: 0 = no pain, 10 = severe and incapacitating pain) , about 31 months** 1.2 with video-assisted arthroscopic microdiscectomy 1.9 with standard discectomy	Reported as not significant	⟷	Not significant

Patient perception of improvement

Compared with standard discectomy We don't know whether video-assisted arthroscopic microdiscectomy is more effective at increasing the number of people "very satisfied" as measured on a 4-point scale in people with confirmed lumbar disc herniation and associated radiculopathy after failed conservative treatment (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[52]	60 people with confirmed lumbar disc herniation and associated radiculopathy after failed conservative treatment	**Proportion of people "very satisfied" on a 4-point satisfaction scale , about 31 months** 22/30 (73%) with video-assisted arthroscopic microdiscectomy 20/30 (67%) with standard discectomy	RR 1.10 95% CI 0.71 to 1.34	⟷	Not significant

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[52]	60 people with confirmed lumbar disc herniation and associated radiculopathy after failed conservative treatment	**Adverse effects** with video-assisted arthroscopic microdiscectomy with standard discectomy The RCT reported that 1 person having open discectomy had leakage of spinal fluid from the dural sac 2 weeks after the operation. No other postoperative complications or neurovascular injuries were observed in either the standard discectomy or microdiscectomy groups			

Microdiscectomy versus automated percutaneous discectomy:

See automated percutaneous discectomy, p 56 .

Further information on studies

[51] Conservative care included prescription of painkillers (details not given), advice to resume daily activities, recommendation of a mobilisation scheme based on time rather than pain (compliance not checked), and referral to a physiotherapist if fearful of movement. Subsequent microdiscectomy was considered for the conservative-care group if sciatica persisted 6 months after randomisation, or earlier (within 6 months) in case of increasing leg pain that was not responsive to drugs and progressive neurological deficit. A total of 125/141 (89%) people in the early microdiscectomy group had microdiscectomy as intended. The remaining 16 people spontaneously recovered. A total of 55/142 (39%) people in the conservative-care group went on to have microdiscectomy in the first year, and one further 7 (5%) had microdiscectomy in the second year after randomisation. The results presented above are based on an intention-to-treat analysis. The interventions in the two groups may have been too similar to detect a significant difference in the outcomes measured at 6 months' to 2 years' follow-up.

[52] 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).

Comment: We found one further trial on microsurgery lumbar discectomy that was written in Chinese. [53] We are currently awaiting full text translation and we will assess this for inclusion in our next update.

OPTION STANDARD DISCECTOMY

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- Both standard discectomy and microdiscectomy seem to increase self-reported improvement to a similar extent.

Benefits and harms

Standard discectomy versus conservative treatment:

We found one systematic review (search date 2007, 2 RCTs). [23]

Pain

Compared with conservative treatment We don't know whether standard discectomy is more effective at improving pain at 1 to 2 years in people with lumbar disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[54] RCT	126 people with symptomatic L5/S1 disc herniation In review [23] The randomisation procedure used in this study was not clear	**Proportion of people reporting their improvement as "good" , 1 year** 39/60 (65%) with standard discectomy 24/66 (36%) with conservative treatment (physiotherapy for 6 weeks) Improvement graded in terms of pain and function into 4 categories: "good" (completely satisfied), "fair", "poor", and "bad" (completely incapacitated for work because of pain)	RR 1.79 95% CI 1.30 to 2.18 NNT 3, 95% CI 2 to 9 Contributors' own calculations	●○○	standard discectomy
[54] RCT	126 people with symptomatic L5/S1 disc herniation In review [23] The randomisation procedure used in this study was not clear	**Proportion of people reporting their improvement as "good" , 4 years** 40/60 (67%) with standard discectomy 34/66 (51%) with conservative treatment (physiotherapy for 6 weeks) Improvement graded in terms of pain and function into 4 categories: "good" (completely satisfied), "fair", "poor", and "bad" (completely incapacitated for work because of pain)	RR 1.29 95% CI 0.96 to 1.56 Contributors' own calculations	⟷	Not significant
[54] RCT	126 people with symptomatic L5/S1 disc herniation In review [23] The randomisation procedure used in this study was not clear	**Proportion of people reporting their improvement as "good" , 10 years** 35/60 (58%) with standard discectomy 37/66 (56%) with conservative treatment (physiotherapy for 6 weeks) Improvement graded in terms of pain and function into 4 categories: "good" (completely satisfied), "fair", "poor", and "bad" (completely incapacitated for work because of pain)	RR 1.04 95% CI 0.73 to 1.32 Contributors' own calculations	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**Short Form (SF)-36 Bodily Pain mean improvement in pain on a scale from 0 to 100 from baseline , 3 months** 30.5 with standard open discectomy 27.6 with non-operative treatment	Difference +2.9 95% CI –2.2 to +8.0	⟷	Not significant
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**SF-36 Bodily Pain mean improvement in pain on a scale from 0 to 100 from baseline , 1 year** 39.7 with standard open discectomy 36.9 with non-operative treatment	Difference +2.8 95% CI –2.3 to +7.8	⟷	Not significant
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**SF-36 Bodily Pain mean improvement in pain on a scale from 0 to 100 from baseline , 2 years** 40.3 with standard open discectomy 37.1 with non-operative treatment	Difference +3.2 95% CI –2.0 to +8.4	⟷	Not significant

Functional improvement

Compared with conservative treatment We don't know whether standard discectomy is more effective at improving function or Oswestry Disability Index at 1 to 2 years in people with lumbar disc herniation (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Short Form-36 Physical Function scores					
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**Short Form (SF)-36 Physical Function mean improvement on a scale from 0 to 100 from baseline score , 3 months** 27.7 with standard open discectomy 24.9 with non-operative treatment	Difference +2.8 95% CI –2.5 to +8.1	⟷	Not significant
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**SF-36 Physical Function mean improvement on a scale from 0 to 100 from baseline score , 1 year** 27.7 with standard open discectomy 24.9 with non-operative treatment	Difference +2.8 95% CI –2.5 to +8.1	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**SF-36 Physical Function mean improvement on a scale from 0 to 100 from baseline score , 2 years** 35.9 with standard open discectomy 35.9 with non-operative treatment	Difference 0 95% CI –5.4 to +5.5	⟷	Not significant
Oswestry Disability Index					
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**Oswestry Disability Index mean reduction in disability score from baseline on a scale from 0 to 100 , 3 months** –26.0 with standard open discectomy –21.3 with non-operative treatment	Difference –4.7 95% CI –9.3 to –0.2	○○○	open discectomy
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**Oswestry Disability Index mean reduction in disability score from baseline on a scale from 0 to 100 , 1 year** –30.6 with standard open discectomy –27.4 with non-operative treatment	Difference –3.2 95% CI –7.8 to +1.3	⟷	Not significant
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**Oswestry Disability Index mean reduction in disability score from baseline on a scale from 0 to 100 , 2 years** –31.4 with standard open discectomy –28.7 with non-operative treatment	Difference –2.4 95% CI –7.4 to +1.9	⟷	Not significant

Adverse effects

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Adverse effects					
[55] RCT	501 surgical candidates; mean age 42 years; 42% female, with imaging-confirmed lumbar intervertebral disc herniation and at least 6 weeks of radicular symptoms In review [23]	**Perioperative complications** with standard open discectomy with non-operative treatment The most common intraoperative complication was dural tear in 10/243 (4%) people; 230/243 (95%) people reported no intraoperative complications. Superficial wound infection was the most		⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		common postoperative complication in 4/243 (2%) people; 226/243 (93%) people reported no postoperative complications. The reoperation rate for recurrent herniation was 5/243 (2%) at 1 year and 8/243 (3%) at 2 years			

No data from the following reference on this outcome. [54]

Standard discectomy versus epidural corticosteroid injection:

See option on epidural corticosteroid injections, p 4 .

Standard discectomy versus microdiscectomy:

We found one systematic review (search date 2007, 3 RCTs, 219 people) [23] and two subsequent RCTs [56] [57] comparing standard discectomy versus microdiscectomy. The review did not perform a meta-analysis of the three RCTs because outcomes were not comparable.

Pain

Compared with microdiscectomy We don't know how standard discectomy and microdiscectomy compare at reducing pain in people with herniated disc (very-low quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Pain					
[58] RCT	60 people with lumbar disc herniation In review [23]	**Pre- and postoperative pain scores measured on visual analogue scale (VAS)** with standard discectomy with microdiscectomy Absolute results not reported	Reported as "similar" P value not reported		
[59] RCT	79 people with lumbar disc herniation In review [23]	**Pain in the legs or back measured on VAS , 6 weeks** with standard discectomy with microdiscectomy Absolute results not reported			
[23] RCT	80 people Data from 1 RCT	**"Clinical outcomes" (not further specified) , 15 months** with standard discectomy with microdiscectomy Absolute results not reported	Reported as "similar" Significance not assessed		
[56] RCT	119 people	**Mean intensity of sciatic pain scores** 1.3 with macrodiscectomy 1.2 with microdiscectomy	P = 0.27	⟷	Not significant
[56] RCT	119 people	**Mean change in Japanese Orthopaedic Association (JOA) score from baseline: scale**	P = 0.08	⟷	Not significant

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
		from −6 to +29; higher scores indicating better outcomes 27 with macrodiscectomy 27 with microdiscectomy			
[57] RCT	40 people with sciatica that did not respond to conservative treatment, and posterolateral herniated lumbar disc observed on MRI scans	**Pain measured on VAS: 0 = no pain, 10 = worst pain ever experienced , 24 months** mean 0, range (0−6) with open discectomy mean 1, range (0−3) with microdiscectomy	P = 0.15	⟷	Not significant

Functional improvement

Compared with microdiscectomy Standard discectomy and microdiscectomy may be equally effective at reducing disability and enabling return to work at 1 month (low-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Oswestry Disability Index					
[57] RCT	40 people with sciatica that did not respond to conservative treatment, and posterolateral herniated lumbar disc observed on MRI scan	**Oswestry Disability Index (score range 0−100) , 24 months** Median (range) score: 10 (0−30) with open discectomy Median (range) score: 10 (0−22) with microdiscectomy	P = 0.87	⟷	Not significant
Return to work and normal activities					
[57] RCT	40 people with sciatica that did not respond to conservative treatment, and posterolateral herniated lumbar disc observed on MRI scans	**Mean time to return to work and normal activities between groups** 21 days with open discectomy 21 days with microdiscectomy	P = 0.79	⟷	Not significant

No data from the following reference on this outcome. [23] [56]

Patient perception of improvement

Compared with microdiscectomy Standard discectomy and microdiscectomy seem equally effective at increasing the number of people with lumbar disc herniation who rate their surgeries as "good", "almost recovered", or "totally recovered" at 1 year (moderate-quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Patient perception of improvement					
[58] RCT	60 people with lumbar disc herniation In review [23]	**Proportion of people who rated their operative outcome as "good", "almost recovered", or "totally recovered" , 1 year** 26/30 (87%) with standard discectomy 24/30 (80%) with microdiscectomy	RR 1.08 95% CI 0.78 to 1.20 The RCT also found similar changes in both groups in preoperative and postoperative pain scores, and in time taken to return to work (pain scores: visual analogue scale [VAS]; P value not reported; time taken to return to work: 10 weeks in both groups)	⟷	Not significant

No data from the following reference on this outcome. [23] [56] [57]

Adverse effects

No data from the following reference on this outcome. [23] [56] [57] [58]

Further information on studies

[54] The RCT comparing standard discectomy versus conservative treatment had considerable crossover between the two treatment groups. Of 66 people randomised to receive conservative treatment, 17 received surgery; of 60 people randomised to receive surgery, one refused the operation. The results presented above are based on an intention-to-treat analysis.

[55] This RCT had nearly 50% crossover in both directions. Of 232 people randomised to surgery and included in the analysis, only 140/232 (60%) had surgery. Of the 240 people randomised to non-operative care and included in the intention-to-treat analysis, 107/204 (52%) had surgery. The 3-year and 4-year follow-up results from this study were published separately. [60] The follow-up at these end points was <80% of randomised participants, so data are not reported above. Similar results for Short Form (SF)-36 scores measuring improvement in pain and Oswestry Disability Index measuring reduction in disability were observed between the group of people who had surgery and the group of people who had non-surgical treatment at both 3 and 4 years.

[56] The RCT analysed the difference in scores between groups after surgery, without comparing the change in score from baseline to end point between groups. The baseline scores for sciatic pain intensity and Japanese Orthopaedic Association scores did not differ significantly at baseline or after surgery. There was, however, a significant difference in leg pain scores at baseline as well as after surgery. Therefore, analysis of the data found neither surgery better than the other.

[57] The RCT stated that only those participants with a final postoperative follow-up period of at least 2 years were included in this study. The RCT reported no information on the number of people who withdrew. It is unclear whether 40 people were originally recruited for the study, or whether this was adjusted based on the follow-up rate.

[58] The RCT also found similar changes in both groups in time taken to return to work (10 weeks in both groups).

Comment: **Standard discectomy versus epidural corticosteroid injection:**
See comment in epidural corticosteroid injections, p 4 .

OPTION AUTOMATED PERCUTANEOUS DISCECTOMY

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no clinically important results from RCTs about automated percutaneous discectomy compared with either conservative treatment, standard discectomy, or microdiscectomy.

Benefits and harms

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 versus standard discectomy. [61]

Automated percutaneous discectomy versus microdiscectomy:

We found one systematic review (search date 2007), [23] which identified one RCT that met our inclusion criteria. [62] The review did not perform a meta-analysis. One identified RCT did not meet our inclusion criteria due to a high follow-up loss (>20%) and is not discussed further.

Pain

Compared with microdiscectomy Automated percutaneous discectomy may be less effective at increasing treatment success rates (very-low quality evidence).

Ref (type)	Population	Outcome, Interventions	Results and statistical analysis	Effect size	Favours
Treatment success					
[62] RCT	71 people with radiographical confirmation of disc herniation	**Proportion of people with outcome classified as "success" by clinician and masked observer (details not reported)** 9/31 (29%) with automated percutaneous discectomy 32/40 (80%) with microdiscectomy	P <0.001 Trial stopped prematurely, after an interim analysis at 6 months	○○○	microdiscectomy

Adverse effects

No data from the following reference on this outcome. [62]

Further information on studies

Comment: None.

OPTION LASER DISCECTOMY

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about laser discectomy for the treatment of people with symptomatic herniated lumbar disc.

Benefits and harms

Laser discectomy:

Four systematic reviews (search dates not reported, [61] 2007, [23] 2000, [63] and 2009 [64]) found no RCTs on the effectiveness of laser discectomy that met *Clinical Evidence* reporting criteria. One of the reviews [64] identified observational studies, ranging from case reports to large non-randomised studies (see further information on studies).

Further information on studies

[64] This systematic review found many observational studies on percutaneous disc decompression with laser assisted disc removal. Most studies did not meet the quality reporting criteria of the systematic review (lumbar disc pain of at least 3 months' duration; treatment with percutaneous laser disc compression; minimum follow-up of 12 months; at least 50 participants included), but of the 10 that did, all showed a positive effect on pain relief. Several studies reported adverse effects or complications. Overall the most frequently reported complication was spondylodiscitis, which ranged from 0% (4 studies) to 1.2% (1 study). In one study of 164 people, there was 1 case of an instrument tip being faulty, 12 cases of postoperative dermatomal dysaesthesia, and 2 cases of reflex sympathetic dystrophy. In one retrospective study of 658 people, 1.1% reported intraoperative complications and 1.5% reported postoperative complications, including 4 radicular deficits, 3 incidences of L5 nerve root injury, 2 incidences of vascular injuries, 1 incidence of sigmoid artery injury, 1 incidence of anomalous iliolumbar artery injury, and 1 incidence of transverse process injury. There was a case report of subacute cauda equine syndrome.

Comment: None.

OPTION PERCUTANEOUS DISC DECOMPRESSION

- For GRADE evaluation of interventions for Herniated lumbar disc, see table, p 62 .
- We found no direct information from RCTs about percutaneous disc decompression for the treatment of people with symptomatic herniated lumbar disc.

Benefits and harms

Percutaneous disc decompression:

We found one systematic review (search date 2006), which found no RCTs of percutaneous disc decompression for lumbar disc herniation. [65]

Further information on studies

[65] The systematic review also searched for non-experimental descriptive studies, expert opinion, and clinical experience of respected authorities. These data are not included in this review.

Comment: We also found a systematic review on percutaneous disc decompression that was not written in English. [66] We are currently awaiting full text translation and we will assess this for inclusion in our next update.

GLOSSARY

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.

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.

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

Automated percutaneous discectomy Percutaneous disc decompression using a combined irrigation, suction, and cutting device inserted through a cannula.

Cauda equina syndrome Compression of the cauda equina, causing symptoms that include changes in perineal sensation (saddle anaesthesia) and loss of sphincter control. The cauda equina is a collection of spinal roots descending from the lower part of the spinal cord, which occupy the vertebral canal below the spinal cord.

Japanese Orthopaedic Association (JOA) score This score is for clinical symptoms in people with herniated lumbar disc. Functionality and pain are measured across 4 parameters, on a scale from −6 to +29, with higher scores indicating better outcomes: first, subjective symptoms (0–9 points; low back pain leg pain, tingling gait, or both);

second, clinical signs (0–6 points; straight leg raising test sensory disturbance motor disturbance); third, restriction in activities (0–14 points; turn over while lying, standing, washing, leaning forward, sitting for about 1 hour, lifting or holding a heavy object, walking); and fourth, urinary bladder function (–6 points maximum).

Lasègue'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.

Low-quality evidence Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

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 the patient's symptoms, with a maximum force of about 30 kg as measured by a force transducer in the belt.

Moderate-quality evidence Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

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.

Percutaneous disc decompression Any technique for discectomy performed through percutaneous portals inserted with x-ray control, generally removing intradiscal fragments rather than sequestrated extradiscal fragments.

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).

Short Form (SF)-36 A health-related quality-of-life scale across 8 domains: limitations in physical activities (physical component), limitations in social activities, limitations in usual role activities owing to physical problems, pain, psychological distress and wellbeing (mental health component), limitations in usual role activities because of emotional problems, energy and fatigue, and general health perceptions.

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

Very low-quality evidence Any estimate of effect is very uncertain.

SUBSTANTIVE CHANGES

Corticosteroids (epidural injections) New evidence added. [17] [18] [19] [21] Categorisation unchanged (Unknown effectiveness), as there remains insufficient evidence to judge the effects of this intervention because the evidence is inconsistent.

Laser discectomy New evidence added. [64] Categorisation unchanged (Unknown effectiveness), as there remains insufficient evidence to judge the effects of this intervention.

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Disclaimer

GRADE **Evaluation of interventions for Herniated lumbar disc.**

Important outcomes	Functional improvement, Need for surgery, Pain, Patient perception of improvement, Quality of life								
Studies (Participants)	**Outcome**	**Comparison**	**Type of evidence**	**Quality**	**Consistency**	**Directness**	**Effect size**	**GRADE**	**Comment**
What are the effects of drug treatments for herniated lumbar disc?									
8 (705) [16] [17] [19] [20] [21]	Pain	Epidural corticosteroid injections versus no epidural corticosteroid injection	4	–1	–1	0	0	Low	Quality point deducted for incomplete reporting of results. Consistency point deducted for different results at different end points
4 (386) [20] [19] [21]	Functional improvement	Epidural corticosteroid injections versus no epidural corticosteroid injection	4	–1	0	0	0	Moderate	Quality point deducted for incomplete reporting of results
2 (417) [15] [20]	Patient perception of improvement	Epidural corticosteroid injections versus no epidural corticosteroid injection	4	0	–1	–1	0	Low	Consistency point deducted for different results at different end points. Directness point deducted for not defining outcome measured
2 (213) [16] [19]	Need for surgery	Epidural corticosteroid injections versus no epidural corticosteroid injection	4	–1	–1	–1	0	Very low	Quality point deducted for sparse data. Consistency point deducted conflicting results among trials. Directness point deducted for narrow included population
1 (36) [22]	Pain	Epidural corticosteroid plus conservative non-operative treatment versus conservative treatment alone	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for wide range of interventions used in comparison, making the results difficult to apply in clinical practice
1 (36) [22]	Functional improvement	Epidural corticosteroid plus conservative non-operative treatment versus conservative treatment alone	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for wide range of interventions used in comparison, making the results difficult to apply in clinical practice
1 (36) [22]	Need for surgery	Epidural corticosteroid plus conservative non-operative treatment versus conservative treatment alone	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for wide range of interventions used in comparison, making the results difficult to apply in clinical practice
1 (100) [24]	Pain	Epidural corticosteroid injection versus discectomy	4	–2	–1	0	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Consistency point deducted for different results at different end points
1 (100) [24]	Functional improvement	Epidural corticosteroid injection versus discectomy	4	–2	–1	0	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Consistency point deducted for different results at different end points
1 (41) [25]	Pain	Infliximab versus placebo	4	–1	0	0	0	Moderate	Quality point deducted for sparse data
1 (41) [25]	Functional improvement	Infliximab versus placebo	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results at 12 weeks
1 (41) [25]	Need for surgery	Infliximab versus placebo	4	–1	0	0	0	Moderate	Quality point deducted for sparse data
3 (321) [15]	Pain	NSAIDs versus placebo	4	0	0	–2	0	Low	Directness points deducted for limited range of NSAIDs assessed and for use of unclear outcome measure in meta-analysis

Important outcomes	Functional improvement, Need for surgery, Pain, Patient perception of improvement, Quality of life								
Studies (Participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
1 (40) [27]	Pain	NSAIDs versus electroacupuncture	4	–1	0	–2	0	Very low	Quality point deducted for sparse data. Directness points deducted for possible inclusion of people without disc herniation and uncertainty about generalisability of outcomes measured
1 (40) [27]	Functional improvement	NSAIDs versus electroacupuncture	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for possible inclusion of people without disc herniation
What are the effects of non-drug treatments for herniated lumbar disc?									
1 (102) [31]	Pain	Spinal manipulation versus placebo or sham treatment	4	–1	0	0	0	Moderate	Quality point deducted for sparse data
1 (102) [31]	Functional improvement	Spinal manipulation versus placebo or sham treatment	4	–2	0	0	0	Low	Quality points deducted for sparse data and for incomplete reporting of results
1 (233) [30]	Patient perception of improvement	Spinal manipulation versus heat treatment	4	–4	0	0	0	Very low	Quality points deducted for incomplete reporting of results and for methodological flaws (not reporting group baseline characteristics, uncertainty about intention-to-treat analysis, poor follow-up, and uncertainty about groups receiving equal number of treatments)
1 (322) [30]	Pain	Spinal manipulation versus exercise therapy	4	–3	0	–1	0	Very low	Quality points deducted for incomplete reporting of results and methodological flaws (not reporting group baseline characteristics and uncertainty about blinding). Directness point deducted for inclusion of people without herniated disc
1 (322) [30]	Patient perception of improvement	Spinal manipulation versus exercise therapy	4	–3	0	–1	0	Very low	Quality points deducted for incomplete reporting of results and methodological flaws (not reporting group baseline characteristics, uncertainty about blinding). Directness point deducted for inclusion of people without herniated disc
1 (322) [30]	Patient perception of improvement	Spinal manipulation versus traction	4	–3	0	–1	0	Very low	Quality points deducted for incomplete reporting of results and methodological flaws (not reporting group baseline characteristics and uncertainty about blinding). Directness point deducted for inclusion of people without herniated disc
1 (112) [35]	Functional improvement	Spinal manipulation versus traction	4	–2	0	0	0	Low	Quality points deducted for sparse data and uncertainty about end point
1 (30) [38]	Pain	Acupuncture versus sham acupuncture	4	–2	0	–2	0	Very low	Quality points deducted for sparse data and incomplete reporting of results. Directness points deducted for inclusion of people without disc herniation
1 (42) [38]	Pain	Laser acupuncture versus sham laser acupuncture	4	–1	0	–2	0	Very low	Quality point deducted for sparse data. Directness points deducted for no long-term results and for inclusion of a wide population making it unclear whether the data are generalisable to herniated disc
1 (58) [39]	Pain	Adding acupuncture to manipulation compared with manipulation alone	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and for unspecified follow-up time. Directness point deducted for no long-term results

Important outcomes	Functional improvement, Need for surgery, Pain, Patient perception of improvement, Quality of life								
Studies (Participants)	Outcome	Comparison	Type of evidence	Quality	Consistency	Directness	Effect size	GRADE	Comment
2 (372) [40] [30]	Pain	Exercise therapy versus traction	4	–2	0	–2	0	Very low	Quality points deducted for incomplete reporting of results and lack of blinding in 1 RCT. Directness points deducted for poorly defined outcome measure in 1 RCT and for inclusion of people without herniated disc
1 (40) [41]	Functional improvement	Adding exercise plus education to conventional non-surgical treatment versus conventional non-surgical treatment alone	4	–1	–1	0	0	Low	Quality point deducted for sparse data. Consistency point deducted as result sensitive to different methods of calculation
1 (110) [42]	Pain	Massage/manipulation versus massage/manipulation plus functional training exercises versus traction	4	–1	0	–2	0	Very low	Quality point deducted for sparse data. Directness points deducted for unclear measurement of outcomes and for including spinal massage techniques (uncertainty about whether results using spinal techniques are comparable with results using other massage techniques)
1 (110) [42]	Pain	Massage/manipulation versus traction	4	–1	0	–2	0	Very low	Quality point deducted for sparse data. Directness points deducted for unclear measurement of outcomes and for including spinal massage techniques (uncertainty about whether results using spinal techniques are comparable with results using other massage techniques)
1 (183) [43]	Pain	Bed rest versus no treatment (watchful waiting)	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted as results were only in people with sciatica, so there is uncertainty about generalisability of results to people with herniated lumbar disc
1 (183) [43]	Functional improvement	Bed rest versus no treatment (watchful waiting)	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted as results were only in people with sciatica, so there is uncertainty about generalisability of results to people with herniated lumbar disc
1 (183) [43]	**Patient perception of improvement**	Bed rest versus no treatment (watchful waiting)	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for uncertainty about generalisability of results for people with herniated lumbar disc
1 (329) [15]	Pain	Traction versus no traction or sham traction	4	–1	0	–2	0	Very low	Quality point deducted for incomplete reporting of results. Directness points deducted for inclusion of people without disc herniation and for inclusion of wide range of traction techniques and comparators
1 (102) [45]	**Functional improvement**	Traction versus no traction or sham traction	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for use of co-intervention
1 (102) [45]	**Patient perception of improvement**	Traction versus no traction or sham traction	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for use of co-intervention
2 (93) [46] [47]	Functional improvement	Autotraction versus passive traction	4	–3	–1	0	0	Very low	Quality points deducted for sparse data, incomplete reporting of results and no intention-to-treat analysis. Consistency point deducted for conflicting results, perhaps owing to different measures of outcome used

Important outcomes	Functional improvement, Need for surgery, Pain, Patient perception of improvement, Quality of life								
Studies (Participants)	**Outcome**	**Comparison**	**Type of evidence**	**Quality**	**Consistency**	**Directness**	**Effect size**	**GRADE**	**Comment**
What are the effects of surgery for herniated lumbar disc?									
2 (339) [50] [51]	Pain	Microdiscectomy versus conservative treatment	4	–1	–1	–1	0	Very low	Quality point deducted for methodological flaw (high crossover between interventions). Consistency point deducted for different results at different end points. Directness point deducted for multiple interventions in comparison
2 (339) [50] [51]	Functional improvement	Microdiscectomy versus conservative treatment	4	–1	–1	–1	0	Very low	Quality point deducted for methodological flaw (high crossover between interventions). Consistency point deducted for different results at different end points. Directness point deducted for multiple interventions in comparison
1 (56) [50]	Quality of life	Microdiscectomy versus conservative treatment	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for multiple interventions in comparison
1 (283) [51]	Patient perception of improvement	Microdiscectomy versus conservative treatment	4	–1	–1	–1	0	Very low	Quality point deducted for methodological flaw (high crossover between interventions). Consistency point deducted for different results at different end points. Directness point deducted for multiple interventions in comparison
1 (60) [52]	Pain	Video-assisted arthroscopic microdiscectomy versus standard discectomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and incomplete reporting of results
1 (60) [52]	Patient perception of improvement	Video-assisted arthroscopic microdiscectomy versus standard discectomy	4	–1	0	–1	0	Low	Quality point deducted for sparse data. Directness point deducted for unclear outcome measure
2 (627) [54] [55]	Pain	Standard discectomy versus conservative treatment	4	–1	–1	0	0	Low	Quality point deducted for high crossover between treatments. Consistency point deducted for different results at different end points
2 (627) [54] [55]	Functional improvement	Standard discectomy versus conservative treatment	4	–1	–1	0	0	Low	Quality point deducted for high crossover between treatments. Consistency point deducted for different results at different end points
5 (378) [23] [56] [57]	Pain	Standard discectomy versus microdiscectomy	4	–1	0	–2	0	Very low	Quality point deducted for sparse data. Directness points deducted for uncertainty about outcomes in 1 study and for uncertainty about baseline differences in another study
1 (40) [57]	Functional improvement	Standard discectomy versus microdiscectomy	4	–2	0	0	0	Low	Quality points deducted for sparse data and unclear follow-up rate
1 (60) [58]	Patient perception of improvement	Standard discectomy versus microdiscectomy	4	–1	0	0	0	Moderate	Quality point deducted for sparse data
1 (71) [62]	Pain	Automated percutaneous discectomy versus microdiscectomy	4	–2	0	–1	0	Very low	Quality points deducted for sparse data and premature termination of the trial. Directness point deducted for unclear outcome measure

We initially allocate 4 points to evidence from RCTs, and 2 points to evidence from observational studies. To attain the final GRADE score for a given comparison, points are deducted or added from this initial score based on preset criteria relating to the categories of quality, directness, consistency, and effect size. Quality: based on issues affecting methodological rigour (e.g., incomplete reporting of results, quasi-randomisation, sparse data [<200 people in the analysis]). Consistency: based on similarity of results across studies. Directness: based on generalisability of population or outcomes. Effect size: based on magnitude of effect as measured by statistics such as relative risk, odds ratio, or hazard ratio.