# 07.01.87 Automated Percutaneous and Percutaneous Endoscopic Discectomy

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### Related Policies:

- 07.01.88 Decompression of the Intervertebral Disc Using Laser Energy (Laser Discectomy) or Radiofrequency-Coblation (Nucleoplasty)
- 07.01.90 Percutaneous Intradiscal Electrothermal Annuloplasty, Radiofrequency Annuloplasty, Biacuplasty and Intraosseous Basivertebral Nerve Ablation

### Summary

### Description

Surgical management of herniated intervertebral discs most commonly involves discectomy or microdiscectomy, performed manually through an open incision. Automated percutaneous discectomy involves placement of a probe within the intervertebral disc under image guidance with aspiration of disc material using a suction cutting device. Endoscopic discectomy involves the percutaneous placement of a

working channel under image guidance, followed by visualization of the working space and instrumentation through an endoscope, and aspiration of disc material.

## Summary of Evidence

For individuals who have herniated intervertebral disc(s) who receive automated percutaneous discectomy, the evidence includes randomized controlled trials (RCTs) and systematic reviews of observational studies. Relevant outcomes are symptoms, functional outcomes, quality of life (QOL), and treatment-related morbidity. The published evidence from small RCTs is insufficient to evaluate the impact of automated percutaneous discectomy on the net health outcome. Well-designed and executed RCTs are needed to determine the benefits and risks of this procedure. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have herniated intervertebral disc(s) who receive percutaneous endoscopic discectomy, the evidence includes a number of RCTs, systematic reviews, and observational studies. Relevant outcomes are symptoms, functional outcomes, QOL, and treatment-related morbidity. Many of the more recent RCTs are conducted at institutions within China. There are few reports from the United States. Results do not reveal a consistently significant improvement in patient-reported outcomes and treatment-related morbidity with percutaneous endoscopic discectomy in comparison to other discectomy interventions. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

## Additional Information

### 2018 Input

Clinical input was sought to help determine whether the use of automated percutaneous discectomy or endoscopic percutaneous discectomy for individuals with herniated intervertebral discs would provide a clinically meaningful improvement in net health outcome and whether the use is consistent with generally accepted medical practice. In response to requests, clinical input was received from 3 respondents, including 2 specialty society-level response(s); no physician-level responses identified through a specialty society; 1 physician-level response identified through an academic medical center.

For individuals who have herniated intervertebral discs who receive automated percutaneous discectomy or percutaneous endoscopic discectomy, clinical input does not support a clinically meaningful improvement in net health outcome and does not indicate this use is consistent with generally accepted medical practice. Clinical input suggests that automated percutaneous discectomy may be an appropriate treatment option for the highly selected patient who has a small focal disc fragment compressing a lumbar nerve causing radiculopathy in the absence of lumbar stenosis or severe bony foraminal stenosis. Similarly, clinical input suggests that endoscopic percutaneous discectomy may be an appropriate treatment option for the highly selected individual who has a small focal disc herniation causing lumbar radiculopathy. However, respondents were mixed in the level of support for this indication, and overall, the clinical input is not generally supportive of a clinically meaningful improvement in net health outcome.

Further details from clinical input are included in the Appendix.

## OBJECTIVE

The objective of this evidence review is to evaluate whether the use of automated percutaneous discectomy or endoscopic percutaneous discectomy improves the net health outcome in individuals with herniated intervertebral discs.

## PRIOR APPROVAL

Not applicable.

## POLICY

Automated percutaneous discectomy is considered **investigational** as a technique of intervertebral disc decompression in individuals with back pain and/or radiculopathy related to disc herniation in the lumbar, thoracic, or cervical spine. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Percutaneous endoscopic discectomy is considered **investigational** as a technique of intervertebral disc decompression in individuals with back pain and/or radiculopathy related to disc herniation in the lumbar, thoracic, or cervical spine. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

## POLICY GUIDELINES

### Coding

See the Codes table for details.

## BACKGROUND

Back pain or radiculopathy related to herniated discs is an extremely common condition and a frequent cause of chronic disability. Although many cases of acute low back pain and radiculopathy will resolve with conservative care, surgical decompression is often considered when the pain is unimproved after several months and is clearly neuropathic in origin, resulting from irritation of the nerve roots. Open surgical treatment typically consists of discectomy in which the extruding disc material is excised. When performed with an operating microscope, the procedure is known as a microdiscectomy.

Minimally invasive options have also been researched, in which some portion of the disc is removed or ablated, although these techniques are not precisely targeted at the offending extruding disc material. Ablative techniques include laser discectomy and radiofrequency decompression (see evidence review 07.01.88). Intradiscal electrothermal annuloplasty (see evidence review 07.01.90) is another minimally invasive approach to low back pain. In this technique, radiofrequency energy is used to treat the surrounding disc annulus.

This policy addresses automated percutaneous and endoscopic discectomy, in which the disc decompression is accomplished by the physical removal of disc material rather than its ablation. Traditionally, discectomy was performed manually through an open incision, using cutting forceps to remove nuclear material from within the disc annulus. This technique was modified by automated devices that involve placement of a probe within the intervertebral disc and aspiration of disc material using a suction cutting device. Endoscopic techniques may be intradiscal or may involve extraction of noncontained and sequestered disc fragments from inside the spinal canal using an interlaminar or transforaminal approach. Following insertion of the endoscope, decompression is performed under visual control.

### Regulatory Status

The Dekompressor® Percutaneous Discectomy Probe (Stryker), Herniatome Percutaneous Discectomy Device (Gallini Medical Devices), and the Nucleotome® (Clarus Medical) are examples of percutaneous discectomy devices that have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process. The FDA indication for these products is for "aspiration of disc material during percutaneous discectomies in the lumbar, thoracic and cervical regions of the spine." FDA product code: HRX.

A variety of endoscopes and associated surgical instruments have also been cleared for marketing by FDA through the 510(k) process.

## RATIONALE

This evidence review was created in October 2010 with searches of the PubMed database. The most recent literature update was performed through July 2025.

Evidence reviews assess the clinical evidence to determine whether the use of technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function, including benefits and harms. Every clinical condition has specific outcomes that are important to patients and managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of technology, 2 domains are examined: the relevance, and quality and credibility. To be relevant, studies must represent 1 or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. RCTs are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

## Automated Percutaneous Discectomy

### *Clinical Context and Therapy Purpose*

The purpose of automated percutaneous discectomy is to provide a treatment option that is an alternative to or an improvement on existing therapies for individuals with herniated intervertebral disc(s).

The following PICO was used to select literature to inform this review.

### *Populations*

The relevant population of interest is individuals with herniated intervertebral disc(s).

### *Interventions*

The therapy being considered is automated percutaneous discectomy.

### *Comparators*

The following therapies and practices are currently being used to treat herniated intervertebral disc(s): conservative therapy and open discectomy or microdiscectomy.

### *Outcomes*

The general outcomes of interest are symptoms, functional outcomes, QOL, and treatment-related morbidity. Specific outcomes measured by specific instruments may include improvements in functional outcomes assessed on the Oswestry Disability Index (ODI), reductions in pain using a visual analog scale (VAS), improvements in quality of life measured on the 36-Item Short-Form Health Survey (SF-36) and Euro-QOL-5D, and treatment-related morbidity including surgical success/failure and complications. To assess outcomes, follow-up at 1 year is considered appropriate.

### Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess longer term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

### Review of Evidence

### Systematic Reviews

Systematic reviews have assessed automated percutaneous discectomy compared to other interventions; however, the majority of these reviews contained observational studies published more than a decade ago with generally small patient populations and inconsistent results. Lewis et al (2015) published the most recent systematic review and network meta-analysis comparing trials of 21 different treatment strategies for sciatica. Examples of the 21 treatment strategies included in the analysis include conservative care, disc surgery, intraoperative interventions, epidural injections, biologic agents, and percutaneous discectomy. Under the category of "percutaneous discectomy," reviewers combined automated percutaneous discectomy, percutaneous automated nucleotomy, nucleoplasty, and laser discectomy. They searched 28 databases and trial registries through December 2009. Ninety studies were included and 10 involved the percutaneous discectomy category as an intervention. Of the 10, 4 are relevant to this evidence review: 2 case-control studies of percutaneous endoscopic discectomy (2006, 2007), 1 RCT of percutaneous endoscopic discectomy (1993), and 1 RCT of automated percutaneous discectomy (1995). The remaining studies were published in a foreign language or involved other comparators (nucleolysis, chemonucleolysis). The global effects odds ratio for the category of percutaneous discectomy compared with inactive control was 0.82 (95% confidence interval [CI], 0.39 to 1.72), which was inferior to disc surgery, epidural injections, and intraoperative interventions. The pain intensity weighted mean difference for the category of percutaneous discectomy compared with inactive control was 11.5 (95% CI, -18.6 to 41.6). Reviewers concluded that there was no support for the effectiveness of percutaneous discectomy for the treatment of sciatica. Due to the inclusion of additional interventions into the broad category of percutaneous discectomy in this review, the relevance of these results to this evidence review is limited.

## Randomized Controlled Trials

The 2002 Lumbar Automated Percutaneous Discectomy Outcomes Group (LAPDOG) trial was an RCT to compare automated percutaneous discectomy with open discectomy in patients with lumbar disc herniation. No additional RCTs have been identified since the 2002 LAPDOG trial. The trial was designed to recruit 330 patients but enrolled 36 patients for reasons not readily apparent. Twenty-seven patients were available at follow-up, with efficacy reported by 41% of those undergoing automated percutaneous discectomy and by 40% of those undergoing conventional discectomy. The trialists concluded that "It is difficult to understand the remarkable persistence of percutaneous discectomy in the face of a virtually complete lack of scientific support for its effectiveness in treated lumber disc herniation." Tables 1 through 4 more fully describe key characteristics, results, and limitations of the LAPDOG trial, respectively.

**Table 1. Characteristics of the LAPDOG Trial**

| Study | Countries | Sites | Dates | Participants | Interventions |
|---|---|---|---|---|---|
| Haines et al (2002) | US, Canada | 10 | NR | Patients with predominantly unilateral leg pain or paresthesia with no previous treatment for lumbar spinal disease, at least 2 of 4 objective signs, and an | Automated percutaneous discectomy vs. conventional discectomy |

| Study | Countries | Sites | Dates | Participants | Interventions |
|---|---|---|---|---|---|
| | | | | imaging study confirming disc herniation at the appropriate level | |

LAPDOG: Lumbar Automated Percutaneous Discectomy Outcomes Group; NR: not reported.

**Table 2. Results of the LAPDOG Trial**

| Study | Treatment success[a] (at 6 months) | Treatment failure[b] (at 6 months) | SF-36 Physical Functioning Subscore | SF-36 General Health Subscore | Modified Roland Score |
|---|---|---|---|---|---|
| Haines et al (2002) | | | | | |
| N | 27 | 27 | NR | NR | NR |
| Automated percutaneous discectomy, | 7 (41%) | 10 (59%) | Pre- vs. postoperative mean difference: 35.7 | Pre- vs. postoperative mean difference: 5.0 | Pre- vs. postoperative mean difference: 9.7 |
| Conventional discectomy | 4 (40%) | 6 (60%) | Pre- vs. postoperative mean difference: 36.1 | Pre- vs. postoperative mean difference: 8.0 | Pre- vs. postoperative mean difference: 10.6 |
| p | .95 | .95 | .96 | .58 | .74 |

LAPDOG: Lumbar Automated Percutaneous Discectomy Outcomes Group; NR: not reported; SF-36: 36-Item Short-Form Health Survey.
aSuccess was defined as either an excellent or good result as defined by an outcome matrix.
bFailure was defined as not achieving success or requiring a second procedure during the follow-up period.

**Table 3. Study Relevance Limitations of the LAPDOG Trial**

| Study | Population[a] | Intervention[b] | Comparator[c] | Outcomes[d] | Duration of Follow-up[e] |
|---|---|---|---|---|---|
| Haines et al (2002) | 3. Investigators believed that study inclusion criteria reflected an existing population with lumbar disc disease; however, results from only 27 patients were eventually analyzed from a planned enrollment of 330 patients | | | 4. Primary outcomes of "success" or "failure" largely subjective in nature; investigators admit that the outcome measurement tool used can not be precisely reproduced | 1,2. Outcomes reported only for 6 months of follow-up; 12 month follow-up was achieved for only 19 patients and the study did not report any of these results |

LAPDOG: Lumbar Automated Percutaneous Discectomy Outcomes Group.
The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.[a] Population key: 1. Intended use population unclear; 2. Study population is unclear; 3. Study population not representative of intended use; 4, Enrolled populations do not reflect relevant diversity; 5. Other.
b Intervention key: 1. Not clearly defined; 2. Version used unclear; 3. Delivery not similar intensity as comparator; 4. Not the intervention of interest (e.g., proposed as an adjunct but not tested as such); 5: Other.
c Comparator key: 1. Not clearly defined; 2. Not standard or optimal; 3. Delivery not similar intensity as intervention; 4. Not delivered effectively; 5. Other.
d Outcomes key: 1. Key health outcomes not addressed; 2. Physiologic measures, not validated surrogates; 3. Incomplete reporting of harms; 4. Not establish and validated measurements; 5. Clinically significant difference not prespecified; 6. Clinically significant difference not supported; 7. Other.
e Follow-Up key: 1. Not sufficient duration for benefit; 2. Not sufficient duration for harms; 3. Other.

**Table 4. Study Design and Conduct Limitations of the LAPDOG Trial**

| Study | Allocation[a] | Blinding[b] | Selective Reporting[c] | Data Completeness[d] | Power[e] | Statistical[f] |
|---|---|---|---|---|---|---|
| Haines et al (2002) | | 1,2. Blinding did not appear to occur | | 1. Of 34 initially randomized patients, 9 were lost to follow-up, 6 month follow-up data was obtained on only 27 patients, and 12 month follow-up data was obtained for only 19 patients | 3. Power estimates led the investigators to plan enrollment of 330 patients in order to reliably identify a difference in success rate of 15% or greater; results were analyzed on 27 patients | 1. Beyond the cursory discussion of lack of power, a discussion of the statistical analyses is nonexistent |

LAPDOG: Lumbar Automated Percutaneous Discectomy Outcomes Group.

The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
aAllocation key: 1. Participants not randomly allocated; 2. Allocation not concealed; 3. Allocation concealment unclear; 4. Inadequate control for selection bias.
bBlinding key: 1. Not blinded to treatment assignment; 2. Not blinded outcome assessment; 3. Outcome assessed by treating physician.
cSelective Reporting key: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
dData Completeness key: 1. High loss to follow-up or missing data; 2. Inadequate handling of missing data; 3. High number of crossovers; 4. Inadequate handling of crossovers; 5. Inappropriate exclusions; 6. Not intent to treat analysis (per protocol for noninferiority trials).
ePower key: 1. Power calculations not reported; 2. Power not calculated for primary outcome; 3. Power not based on clinically important difference.
fStatistical key: 1. Analysis is not appropriate for outcome type: (a) continuous; (b) binary; (c) time to event; 2. Analysis is not appropriate for multiple observations per patient; 3. Confidence intervals and/or p values not reported; 4. Comparative treatment effects not calculated.

All published trials have focused on lumbar disc herniation. There were no RCTs of automated percutaneous discectomy for cervical or thoracic disc herniation. A review of the evidence from American Society of Interventional Pain Physicians (2013) noted that "even though Dekompressor [disc removal system] may be considered a new interventional modality, the early studies were published approximately 8 years ago. Consequently, one would expect that the technique's continued use would be supported by more recent, high-quality evaluations."

### Section Summary: Automated Percutaneous Discectomy

The evidence for automated percutaneous discectomy in individuals who have herniated intervertebral disc(s) includes small RCTs and systematic reviews. Evidence from small RCTs does not support the use of this procedure. Well-designed and executed RCTs are needed to determine the benefits and risks of this procedure.

## Percutaneous Endoscopic Discectomy

### *Clinical Context and Therapy Purpose*

The purpose of percutaneous endoscopic discectomy is to provide a treatment option that is an alternative to or an improvement on existing therapies for individuals with herniated intervertebral disc(s).

The following PICO was used to select literature to inform this review.

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The relevant population of interest is individuals with herniated intervertebral disc(s).

### *Interventions*

The therapy being considered is percutaneous endoscopic discectomy.

### *Comparators*

The following therapies and practices are currently being used to treat herniated intervertebral disc(s): conservative therapy and open discectomy or microdiscectomy.

### *Outcomes*

The general outcomes of interest are symptoms, functional outcomes, QOL, and treatment-related morbidity. Specific outcomes measured by specific instruments may include improvements in functional outcomes assessed on the Oswestry Disability Index (ODI), reductions in pain using a visual analog scale (VAS), improvements in quality of life measured on the 36-Item Short-Form Health Survey (SF-36) and Euro-QOL-5D, and treatment-related morbidity including surgical success/failure and complications. To assess outcomes, follow-up at 1 year is considered appropriate.

### Study Selection Criteria

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- To assess longer term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

## Review of Evidence

## Systematic Reviews

A number of systematic reviews have evaluated the efficacy and safety of percutaneous endoscopic discectomy compared to open discectomy or microendoscopic discectomy. Characteristics and results of these reviews are summarized in Tables 5 and 6.

**Table 5. Summary of Systematic Reviews of Percutaneous Endoscopic Discectomy Versus Other Discectomy Procedures**

| Study | Dates | Trials | Participants | N (Range) | Design | Duration |
|---|---|---|---|---|---|---|
| Zhao et al (2022) | To May 2022 | 33 | Patients with lumbar disc herniation who underwent PTED, MED or other surgical procedures | 6467 (20-1856) | 7 RCTs; 26 non-randomized controlled retrospective studies | Not reported |
| Bai et al (2021) | To February 2018 | 14 | Patients with lumbar disc herniation who underwent PELD or other surgical procedures | 2528 (74-902) | 4 RCTs; 10 cohort studies | Not reported |
| Gadjradj et al (2021) | To April 2020 | 14 | Patients with lumbar disc herniation who underwent PTED or open microdiscectomy | 1465 (30-462) | 9 RCTs; 5 prospective nonrandomized comparative studies | Follow-up: 3 to 12 months |
| Xu et al (2020) | Search dates not stated; included trials from 2012 to 2018 | 9 | Patients with single-level lumbar disc herniation who underwent PELD or MED for treatment | 984 (51-216) | 1 RCT ; 8 retrospective nonrandomized comparative studies | Follow-up: 1 to > 6 years |
| Zhou et al (2020) | To October 2018 | 12 | Patients with lumbar disc herniation who underwent PELD or MED for treatment | 2400 (40-915) | 4 RCTs; 8 retrospective nonrandomized comparative studies | Follow-up: 3 to 46 months |
| Yu et al (2019) | To August 31, 2018 | 8 | Patients with lumbar disc herniation who underwent PTED or MED procedures and were followed for at least 6 months | 805 (51-216) | 1 RCT ; 7 observational studies | Follow-up: 6 months to 5 years |
| Shi et al (2019) | To July 2018 | 18 | Patients with single-level lumbar disc herniation with sciatica | 2161 (51-273) | 8 prospective studies; 10 retrospective studies | Follow-up: 3 months to >6 years |

| Study | Dates | Trials | Participants | N (Range) | Design | Duration |
|---|---|---|---|---|---|---|
| | | | who underwent PELD or MED for treatment | | | |
| Phan et al (2017) | To February 2016 | 23 | Patients who underwent either an endoscopic or open approach for disc herniation; the endoscopic approach consisted of patients who underwent either FED or MED while the open approach included those who underwent open discectomy or micro-discectomy | 28,487 (20-26,612) | 10 RCTs; 4 prospective observational studies; 9 retrospective observational studies | Follow-up: 3 to 104 months |

FED: full-endoscopic technique discectomy; MED: microendoscopic discectomy; PELD: percutaneous endoscopic lumbar discectomy; PTED: percutaneous transforaminal endoscopic discectomy; RCT: randomized controlled trial

**Table 6. Results of Systematic Reviews of Trials of Percutaneous Endoscopic Discectomy Versus Other Discectomy Procedures**

| Study | Length of stay | Leg pain VAS | Lower back pain VAS | ODI | Overall complication rate | Reoperation | Recurrence or residue |
|---|---|---|---|---|---|---|---|
| Zhao et al (2022) | | | | | | | |
| Total (N) | 1231 | 1487 | 1372 | 1687 | 2,372 | 2,226 | 2,621 |
| Pooled effect (95% CI); p value | MD -2.42 (-3.21 to -1.63);.0001 | MD -0.23(-0.61 to 0.15);.60 | MD -0.49 (-0.84 to -0.14);.006 | MD -2.21 (-4.17 to -0.25);.03 | OR 0.94 (0.67 to 1.32);.71 | OR 1.67 (1.17 to 2.36);.004 | OR 1.55 (1.07 to 2.24);.02 |
| $I^2$ (p) | 95%;.00001 | 51%;.03 | 90%;.00001 | 88%;.00001 | 0%;.65 | 0%;.89 | 0%;.93 |
| Bai et al (2021) | | | | | | | |
| Total (N) | NR | NR | NR | NR | NR | | NR |
| Pooled effect (95% CI); p value | MD -2.59 (-3.87 to -1.31); <.001 | MD 0.00 (-0.10 to 0.10);.991 | MD -0.17 (-0.55 to 0.21);.384 | MD -0.29 (-1.00 to 0.43);.434 | relative risk 0.86 (0.63 to 1.18);.361 | | relative risk 1.65 (1.08 to 2.52);.021 |
| $I^2$ (p) | 72.1%;.001 | 0.0%;.996 | 88.3%; <.001 | 0.0%;.996 | 51.5%;.024 | | 26.1%;.220 |

| Study | Length of stay | Leg pain VAS | Lower back pain VAS | ODI | Overall complication rate | Reoperation | Recurrence or residue |
|---|---|---|---|---|---|---|---|
| Gadjradj et al (2021) | | | | | | | |
| Total (N) | | 621 and 152 | | 621 and 152 | | | |
| Pooled effect (95% CI) | | 3 to 6 month MD 0.05 (-0.10 to 0.21) 12 month MD 0.11 (-0.30 to 0.53) | | 3 to 6 month MD -0.09 (-0.24 to 0.07) 12 month MD -0.11 (-0.45 to 0.24) | | | |
| $I^2$ (p) | | 30%;.23 | | 9%;.83 | | | |
| Xu et al (2020) | | | | | | | |
| Total (N) | NR | NR | NR | NR | NR | NR | NR |
| Pooled effect (95% CI); p value | OR -1.041 (-1.493 to -0.583);.000 | 6 months to 2 years OR -0.138 (-0.384 to 0.108);.270 2 years OR 0.020 (-0.193 to | 6 months to 2 years -0.456 (-0.947 to 0.034);.068 2 years OR -0.856 (-1.488 to -0.224);.008 | 6 months to 2 years -0.077 (-0.370 to 0.215);.604 2 years OR -0.425 (-0.724 to -0.127);.005 | OR 0.972 (0.635 to 1.488);.896 | OR 1.136 (0.415 to 3.108);.805 | OR 1.306 (0.664 to 2.566);.439 |

| Study | Length of stay | Leg pain VAS | Lower back pain VAS | ODI | Overall complication rate | Reoperation | Recurrence or residue |
|---|---|---|---|---|---|---|---|
| | | 0.233);.855 | | | | | |
| $I^2$ (p) | | 53.8%;.090; 6 months to 2 years 4.4%;.351; 2 years | 88%;.000; 6 months to 2 years 86.7%;.001; 2 years | 75.3%;.000; 6 months to 2 years 52.7%;.121; 2 years | | | |
| Zhou et al (2020) | | | | | | | |
| Total (N) | | | | | | 787 | 972 |
| Pooled effect (95% CI); p value | | | | | | OR 1.77 (1.18 to 2.64);.006 | OR 1.60 (1.01 to 2.53);.05 |
| $I^2$ (p) | | | | | | 0%;.97 | 0%;.94 |
| Yu et al (2019) | | | | | | | |
| Total (N) | 707 | NR | NR | NR | 659 | | 443 |
| Pooled effect (95% CI); p value | MD -1.92 (-2.90 to -0.94); <.001 | 1 year postop or last follow-up: MD -0.07 (-0.22 to 0.08);.38 | 1 year postop or last follow-up: MD -0.41 (-0.76 to -0.06);.02 | 1 year postop or last follow-up: MD -0.27 (-1.71 to 1.16);. 71 | MD 1.01 (0.60 to 1.69);.98 | | MD 1.31 (0.54 to 3.17);.54 |
| $I^2$ (p) | 88% | | | | 0% | | 0% |
| Shi et al (2019) | | | | | | | |

| Study | Length of stay | Leg pain VAS | Lower back pain VAS | ODI | Overall complication rate | Reoperation | Recurrence or residue |
|---|---|---|---|---|---|---|---|
| Total (N) | 1717 | 742 | 742 | 1337 | 1527 | 805 | 928 |
| Pooled effect (95% CI); p value | MD -2.29 (3.03 to -1.55); <.00001 | At last follow-up: MD -0.18 (-0.45 to 0.09);.19 | At last follow-up: MD -0.77 (-1.31 to -0.24);.005 | At last follow-up: MD -0.30 (-1.02 to 0.42);.41 | OR 0.96 (0.65 to 1.43);.85 | OR 2.67 (1.07 to 6.67);.04 | OR 2.22 (1.02 to 4.83);.05 |
| $I^2$ (p) | 96%; <.00001 | 88%; <.00001 | 95%; <.00001 | 55%;.01 | 0%;.90 | 0%;.79 | 0%;.86 |
| Phan et al (2017) | | | | | | | |
| Total (N) | 685 | 390 | | 303 | 27,699 | 995 | 1081 |
| Pooled effect (95% CI); p value | MD -4.79 (-6.52 to -3.07); <.00001 | MD -0.04 (-0.37 to 0.30);.84 | | MD -1.88 (-4.06 to 0.29);.09 | OR 0.77 (0.45 to 1.31);.33 | OR 1.46 (0.33 to 6.43);.61 | OR 1.12 (0.60 to 2.09);.73 |
| $I^2$ (p) | 99%; <.00001 | 70%; .003 | | 67%;.03 | 60%;.004 | 66%;.004 | 0%;.97 |

CI: confidence interval; MD: mean difference; NR: not reported; ODI: Oswestry Disability Index; OR: odds ratio; VAS: visual analogue scale.

Results from the systematic reviews were fairly consistent with a significantly reduced length of hospitalization observed with endoscopic discectomy and sometimes significant improvements in VAS or ODI, but only at specific time points. Overall, no consistently significant improvement in VAS, ODI, total complication rate, reoperation, or recurrence was observed with endoscopic discectomy versus other interventions. Authors of the systematic reviews noted multiple limitations including the innate flaws of included studies (i.e., observational designs, a limited number of studies meeting criteria for inclusion, small sample sizes, lack of allocation concealment and blinding), different methodologies contributing to heterogeneity in analyses, loss of usable and sufficient data resulting in difficulty performing accurate analysis of outcomes, and that a majority of the more recently completed studies were completed in China, which may affect the generalizability of the results to other populations.

## Randomized Controlled Trials

More recent RCTs not included in any of the systematic reviews were also identified. Results of these trials are similar to those seen in the more comprehensive systematic reviews - percutaneous endoscopic

discectomy was associated with a significant reduction in length of stay with no consistent or clinically meaningful improvements in patient-reported outcome measures such as VAS and ODI. Two of the 4 RCTs evaluated treatment-related morbidities and reported a reduced incidence of intraoperative and postoperative complications and repeat surgeries with percutaneous endoscopic discectomy. Key characteristics, results, and limitations of these RCTs are summarized in Tables 7 through 10, respectively.

**Table 7. Characteristics of Randomized Controlled Trials of Percutaneous Endoscopic Discectomy**

| Study | Countries | Sites | Dates | Participants | Interventions |
|---|---|---|---|---|---|
| Liu et al 2023 | Korea | 1 | July 2016 to July 2021 | Patients with L5-S1 lumbar disc herniation | Intralaminar endoscopic lumbar discectomy vs microscopic lumbar discectomy |
| Gadjradj et al 2022 | Netherlands | 4 | February 2016 to April 2019 | Patients with sciatica caused by lumbar disc herniation | PTED vs microendoscopic discectomy |
| Ran et al 2021 | China | 1 | August 2016 to February 2020 | Patients with highly migrated lumbar disc herniation | PELD with computerized tomography navigation vs open discectomy |
| Wang et al 2019 | China | 1 | July 2015 to July 2016 | Patients with single-segment lumbar disc herniation with imaging results consistent with symptoms | PTED vs microendoscopic discectomy |

PELD: percutaneous endoscopic lumbar discectomy; PTED: percutaneous transforaminal endoscopic discectomy.

**Table 8. Results of Randomized Controlled Trials of Percutaneous Endoscopic Discectomy**

| Study | Length of stay (days) | Leg pain VAS | Lower back pain VAS | ODI | SF-36 PCS | Complication rates | Repeat surgery within 1 year |
|---|---|---|---|---|---|---|---|
| Liu et al (2023) | | | | | | | |
| N | 28 | 28 | | | | 28 | |
| Mean difference at 12 | | 0.71 (-2.54 to 1.12) | 0.08 (-2.25 to 2.42) | 8.48 (-1.67 to 18.63) | | | |

| Study | Length of stay (days) | Leg pain VAS | Lower back pain VAS | ODI | SF-36 PCS | Complication rates | Repeat surgery within 1 year |
|---|---|---|---|---|---|---|---|
| months (95% CI) | | | | | | | |
| Interlaminar endoscopic lumbar discectomy | 3.69±1.60 days | | | | | Blood loss: 44±26.67 mL | |
| Microscopic lumbar discectomy | 5.47±1.36 days | | | | | Blood loss: 20±20.99 mL | |
| p-value | .003 | | | | | .009 | |
| Gadjradj et al (2022) | | | | | | | |
| N | 420 | 413 | 413 | 413 | 413 | 420 | 420 |
| Pooled effect at 12 months (95% CI) | Median (IQR) PTED: 0 (0 to 0) Microendoscopic discectomy: 1 (1 to 1) | MD, 7.1 (2.8 to 11.3) | MD, 6 (2 to 10) | MD, 5.3 (3.0 to 7.7) | MD, -2.8 (-4.1 to -1.6) | PTED vs microendoscopic discectomy: Dural tears (n=0 vs 8) Nerve root injury (n=0 vs 1) Wound infection (n=3 vs 0) Cerebrospinal fluid leakage (n=1 vs 0) | PTED vs microendoscopic discectomy: n=9 (5%) vs 14 (6%) |
| p-value | | | | | | | |
| Ran et al (2021) | | | | | | | |
| N | | 66 | | | | 66 | |
| PELD with computerized tomography navigation at 12 months | | 0.58 ± 0.90 | | | | Infection, n=0 Recurrence, n=1 | |
| Open discectomy at 12 months | | 0.75 ± 0.84 | | | | Infection, n=1 Recurrence, n=0 | |

| Study | Length of stay (days) | Leg pain VAS | Lower back pain VAS | ODI | SF-36 PCS | Complication rates | Repeat surgery within 1 year |
|---|---|---|---|---|---|---|---|
| p-value | | .58 | | | | >.99 | |
| Wang et al (2019) | | | | | | | |
| N | 90 | 90 | 90 | 90 | | | |
| PTED | Postoperative: 3.01 ± 0.52 | Preoperative mean score vs. 6 months after surgery: 7.21 vs. 1.05 | Preoperative mean score vs 6 months after surgery: 6.40 vs. 1.36 | Preoperative mean score vs 6 months after surgery: 58.21% vs. 17.05% | | | |
| Microendoscopic discectomy | Postoperative: 6.68 ± 0.30 | Preoperative mean score vs. 6 months after surgery: 7.09 vs. 0.98 | Preoperative mean score vs 6 months after surgery: 6.34 vs. 1.65 | Preoperative mean score vs 6 months after surgery: 57.17% vs. 16.98% | | | |
| p-value | .001 | .097 | .523 | .864 | | | |

CI: confidence interval; IQR: interquartile range; MD: mean difference; ODI: Oswestry Disability Index; PELD: percutaneous endoscopic lumbar discectomy; PTED: percutaneous transforaminal endoscopic discectomy; SF-36 PCS: Short-Form-36 Physical Component Score; VAS: visual analogue scale.

**Table 9. Study Relevance Limitations of the Randomized Controlled Trials of Percutaneous Endoscopic Discectomy**

| Study | Population[a] | Intervention[b] | Comparator[c] | Outcomes[d] | Duration of Follow-up[e] |
|---|---|---|---|---|---|
| Liu et al 2023 | 4. Limited to participants from single site in Korea | | | 1. Morbidity-related outcomes such as complications and reoperation were limited | |
| Gadjradj et al 2022 | 4. Limited to participants from 3 sites in the Netherlands | | | | |

| Study | Population[a] | Intervention[b] | Comparator[c] | Outcomes[d] | Duration of Follow-up[e] |
|---|---|---|---|---|---|
| Ran et al 2021 | 4. Limited to participants from single site in China | 4.PELD was used with computerized tomography navigation | | 1. Morbidity-related outcomes such as complications were limited | |
| Wang et al 2019 | 4. Study population similar to other trials with regard to age, sex; however, included patients from a single Chinese hospital | | | 1. Morbidity-related outcomes such as complication and reoperation rates were not reported | 1,2. Outcomes reported only for 6 months of follow-up |

PELD: percutaneous endoscopic lumbar discectomy.
The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
a Population key: 1. Intended use population unclear; 2. Study population is unclear; 3. Study population not representative of intended use; 4, Enrolled populations do not reflect relevant diversity; 5. Other.
bIntervention key: 1. Not clearly defined; 2. Version used unclear; 3. Delivery not similar intensity as comparator; 4.Not the intervention of interest.
cComparator key: 1. Not clearly defined; 2. Not standard or optimal; 3. Delivery not similar intensity as intervention; 4. Not delivered effectively.
dOutcomes key: 1. Key health outcomes not addressed; 2. Physiologic measures, not validated surrogates; 3. No CONSORT reporting of harms; 4. Not establish and validated measurements; 5. Clinical significant difference not prespecified; 6. Clinical significant difference not supported.
eFollow-Up key: 1. Not sufficient duration for benefit; 2. Not sufficient duration for harms.

**Table 10. Study Design and Conduct Limitations of the Randomized Controlled Trials of Percutaneous Endoscopic Discectomy**

| Study | Allocation[a] | Blinding[b] | Selective Reporting[c] | Data Completeness[d] | Power[e] | Statistical[f] |
|---|---|---|---|---|---|---|
| Liu et al 2023 | | 1,2. Blinding did not occur | | | 1. No mention of power | |
| Gadjradj et al 2022 | 4. A proportion of patients with a strong preference for PTED who were randomised to open microdiscectomy dropped out of the study after randomization | 1,2. Blinding did not occur | | | | |

| Study | Allocation[a] | Blinding[b] | Selective Reporting[c] | Data Completeness[d] | Power[e] | Statistical[f] |
|---|---|---|---|---|---|---|
| Ran et al 2021 | 3.Allocation concealment unclear | 1,2. Blinding did not appear to occur | | | 1. Power calculations not reported | |
| Wang et al 2019 | 3.Allocation concealment unclear | 1,2. Blinding did not appear to occur | | | 1. Power calculations not reported | |

PTED: percutaneous transforaminal endoscopic discectomy.
The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
aAllocation key: 1. Participants not randomly allocated; 2. Allocation not concealed; 3. Allocation concealment unclear; 4. Inadequate control for selection bias.
bBlinding key: 1. Not blinded to treatment assignment; 2. Not blinded outcome assessment; 3. Outcome assessed by treating physician.
cSelective Reporting key: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
dData Completeness key: 1. High loss to follow-up or missing data; 2. Inadequate handling of missing data; 3. High number of crossovers; 4. Inadequate handling of crossovers; 5. Inappropriate exclusions; 6. Not intent to treat analysis (per protocol for noninferiority trials).
ePower key: 1. Power calculations not reported; 2. Power not calculated for primary outcome; 3. Power not based on clinically important difference.
fStatistical key: 1. Analysis is not appropriate for outcome type: (a) continuous; (b) binary; (c) time to event; 2. Analysis is not appropriate for multiple observations per patient; 3. Confidence intervals and/or p values not reported; 4. Comparative treatment effects not calculated.

## Observational Studies

Comparative observational studies with at least a 2-year follow-up are summarized below.

Yang et al (2024) published the results of a retrospective study that compared transforaminal endoscopic lumbar discectomy (n=89) to microdiscectomy (n=65) in patients with lumbar disc herniation. The mean follow-up was 5.5 years. Postsurgical VAS scores of the leg and back reached their lowest point at 1 year and were maintained until the final follow-up. Oswestry Disability Index scores continued to decrease until final follow-up in patients who underwent transforaminal endoscopic lumbar discectomy, but remained fairly similar between 1 year and final follow-up among patients who underwent microdiscectomy. Recurrence occurred in 4.49% and 1.54% (p=.31) of patients in the transforaminal endoscopic lumbar discectomy and microdiscectomy groups, respectively.

Saghebdoust et al (2023) published the results of a retrospective study in 434 patients with lumbar disc herniation who underwent transforaminal endoscopic lumbar discectomy or open microdiscectomy. At the end of the 7-year follow-up period, records for 412 patients were evaluable. A similar proportion of patients in both groups had outcomes that were rated as excellent or good (about 88%) according to the modified MacNab criteria. Perioperative complications were similar between groups, but intraoperative blood loss (p<.05) and length of hospital stay (p<.05) were significantly less in the transforaminal endoscopic lumbar discectomy group. Recurrence that required reoperation occurred in 21 patients in the transforaminal endoscopic lumbar discectomy group and 9 patients in the open microdiscectomy group (p<.05).

Yu et al (2021) published the results of a retrospective multicenter study that followed patients for 2 years after receipt of transforaminal percutaneous endoscopic discectomy (n=632) and microendoscopic discectomy (n=421) for lumbar disc herniation. Mean blood loss (p<.001) and mean duration of hospital stay (p=.018) were significantly reduced with transforaminal percutaneous endoscopic lumbar discectomy compared to microendoscopic discectomy. Rates of complications, recurrence, and revisions were similar in both groups. The VAS pain scores did not differ between groups after the first postoperative day. At 1

month postoperatively, there was a significant difference in ODI scores between groups (p=.016) in favor of transforaminal percutaneous endoscopic discectomy, but there was no significant difference at other time points.

Song et al (2021) published a retrospective single-center study that compared percutaneous endoscopic lumbar discectomy (n=306) and microendoscopic discectomy (n=116) in patients undergoing same day ambulatory surgery for lumbar disc herniation. Mean blood loss and mean duration of hospital stay were significantly less with percutaneous endoscopic lumbar discectomy (both p<.001 compared to microendoscopic discectomy). After 3 years of follow-up, e VAS pain scores for the back were also significantly lower in the percutaneous endoscopic lumbar discectomy group compared to the microendoscopic discectomy group (p=.001), but there was no difference between groups in pain scores for the legs (p=.224). Overall recurrence rates (p=.201) and ODI scores (p=.220) were also similar between groups.

A number of observational studies have also assessed the learning curve and the need for longer follow-up for endoscopic discectomy. The largest and longest follow-up to date has been reported by Choi et al (2015), who examined 10,228 patients at their institution who had had percutaneous endoscopic lumbar discectomy over a 12-year period. They found that 4.3% of cases required reoperation in the first 6 weeks due to incomplete removal of herniated discs (2.8%), recurrence (0.8%), persistent pain (0.4%), and approach-related pain (0.2%).

### Section Summary: Percutaneous Endoscopic Discectomy

The evidence for percutaneous endoscopic discectomy in individuals who have herniated intervertebral disc(s) includes a number of RCTs, systematic reviews, and comparative observational studies with at least 2 years of follow up. Many of the more recent RCTs are conducted at institutions within China. There are few reports from the United States. Overall, results from RCTs and systematic reviews reveal a significantly reduced length of hospitalization with endoscopic discectomy and occasionally significant improvements in VAS or ODI, but only at specific time points. No consistently significant improvement in VAS, ODI, total complication rate, reoperation, or recurrence was observed with percutaneous endoscopic discectomy versus other interventions.

## SUPPLEMENTAL INFORMATION

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

### Clinical Input From Physician Specialty Societies and Academic Medical Centers

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

#### 2018 Input

Clinical input was sought to help determine whether the use of automated percutaneous discectomy or endoscopic percutaneous discectomy for individuals with herniated intervertebral discs would provide a clinically meaningful improvement in net health outcome and whether the use is consistent with generally accepted medical practice. In response to requests, clinical input was received from 3 respondents,

including 2 specialty society-level response(s); no physician-level responses identified through a specialty society; 1 physician-level response identified through an academic medical center.

For individuals who have herniated intervertebral discs who receive automated percutaneous discectomy or percutaneous endoscopic discectomy, clinical input does not support a clinically meaningful improvement in net health outcome and does not indicate this use is consistent with generally accepted medical practice. Clinical input suggests that automated percutaneous discectomy may be an appropriate treatment option for the highly selected patient who has a small focal disc fragment compressing a lumbar nerve causing radiculopathy in the absence of lumbar stenosis or severe bony foraminal stenosis. Similarly, clinical input suggests that endoscopic percutaneous discectomy may be an appropriate treatment option for the highly selected patient who has a small focal disc herniation causing lumbar radiculopathy. However, respondents were mixed in the level of support for this indication, and overall the clinical input is not generally supportive of a clinically meaningful improvement in net health outcome.

### 2013 Input

In response to requests, input was received from 4 physician specialty societies and 3 academic medical centers while this policy was under review in 2013. Overall, input agreed that percutaneous and endoscopic discectomy are investigational. Most reviewers considered discectomy with tubular retractors to be a variant of open discectomy, with the only difference being the type of retraction used.

## Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in ‘Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

### *American Pain Society*

The clinical practice guidelines from the American Pain Society (2009) found insufficient evidence to evaluate alternative surgical methods to standard open discectomy and microdiscectomy, including laser or endoscopic-assisted techniques, various percutaneous techniques, coblation nucleoplasty, or the Dekompressor.

### *American Society of Interventional Pain Physicians*

The guidelines from the American Society of Interventional Pain Physicians (2013) indicated that the evidence for percutaneous disc decompression with the Dekompressor was limited. There were no recommended indications for the Dekompressor.

### *American Society of  Pain and Neurosciences*

The American Society of Pain and Neuroscience (ASPN; 2022) published clinical guidance for interventional treatments for low back pain. The guideline states that discectomy procedures (such as percutaneous and endoscopic disc procedures) have favorable safety and efficacy profiles for the treatment of lumbar disc herniation with persistent radicular symptoms; however, it is stated that further research is needed to evaluate complications rates in order for these procedures to supplant classic open

microdiscectomy. Recommendations specific to percutaneous endoscopic discectomy are summarized in Table 11.

**Table 11. Recommendations for Percutaneous and Endoscopic Procedures**

| Recommendation | Grade[a] | Level of Evidence[b] | Level of Certainty [Net Benefit][c] |
|---|---|---|---|
| Percutaneous Endoscopic Discectomy | B | I-a | High |

[a] Grade B: (The ASPN Back Group recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial..
b Evidence Level: I-A: At least one controlled and randomized clinical trial, properly designed

### *National Institute for Health and Care Excellence*

The NICE (2005) published guidance on automated percutaneous mechanical lumbar discectomy, indicating there was limited evidence of efficacy based on uncontrolled case series of heterogeneous groups of patients, and evidence from small randomized controlled trials (RCTs) showed conflicting results. The guidance indicated that, in view of uncertainty about the efficacy of the procedure, it should not be done without special arrangements for consent and for audit or research. The guidance was considered for an update in 2009, but failed review criteria; the 2005 guidance is therefore considered current.

A NICE (2016) guidance on percutaneous transforaminal endoscopic lumbar discectomy for sciatica was published. The guidance stated that current evidence is adequate to support the use of percutaneous transforaminal endoscopic lumbar discectomy for sciatica. Choice of operative procedure (open discectomy, microdiscectomy, or percutaneous endoscopic approaches) may be influenced by symptoms, location, and size of the prolapsed disc.

A NICE (2016) guidance on percutaneous interlaminar endoscopic lumbar discectomy for sciatica was also published. The guidance stated that current evidence is adequate to support the use of percutaneous interlaminar endoscopic lumbar discectomy for sciatica. Choice of operative procedure (open discectomy, microdiscectomy, or percutaneous endoscopic approaches) may be influenced by symptoms, location, and size of the prolapsed disc.

### *North American Spine Society*

The North American Spine Society (2014) published clinical guidelines on the diagnosis and treatment of lumbar disc herniation. Table 12 summarizes recommendations specific to percutaneous endoscopic discectomy and automated percutaneous discectomy.

**Table 12. Recommendations for Lumbar Disc Herniation with Radiculopathy**

| Recommendations | Grade or LOE[a] |
|---|---|
| Endoscopic percutaneous discectomy is suggested for carefully selected patients to reduce early postoperative disability and reduce opioid use compared with open discectomy. | B |
| There is insufficient evidence to make a recommendation for or against the use of automated percutaneous discectomy compared with open discectomy. | I |

| Recommendations | Grade or LOE[a] |
|---|---|
| Endoscopic percutaneous discectomy may be considered for treatment. | C |
| Automated percutaneous discectomy may be considered for treatment. | C |
| Patients undergoing percutaneous endoscopic discectomy experience better outcomes if <40 years and symptom duration <3 months. | II |

LOE: level of evidence.
a Grade B: fair evidence (level II or III studies with consistent findings; grade C: poor quality evidence (level IV or V studies). Level of evidence II: lesser quality randomized controlled trial (eg, <80% follow-up, no blinding, or improper randomization), prospective comparative study, systematic review of level II studies or level I studies with inconsistent results; level of evidence III: case control, retrospective, systematic review of level III studies; level of evidence IV: case series; level of evidence V: expert opinion.

### Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review can be located at clinicaltrials.gov.

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## CODES

To report provider services, use appropriate CPT codes, HCPCS codes, Revenue codes, and/or ICD diagnosis codes.

| Codes | Number | Description |
|---|---|---|
| **CPT** | | |
| | 62287 | Decompression procedure, percutaneous, of nucleus pulposus of intervertebral disc, any method, utilizing needle-based technique to remove disc material under fluoroscopic imaging or other form of indirect visualization, with discography and/or epidural injection(s) at the treated level(s), when performed, single or multiple levels, lumbar |
| | 62380 | Endoscopic decompression of spinal cord, nerve root(s), including laminotomy, partial facetectomy, foraminotomy, discectomy and/or excision of herniated intervertebral disc, I interspace, lumbar |
| | 0274T | Percutaneous laminotomy/laminectomy (interlaminar approach) for decompression of neural elements, (with or without ligamentous resection, discectomy, facetectomy and/or foraminotomy), any method, under indirect image guidance (eg, fluoroscopic, CT), single or multiple levels, unilateral or bilateral;, cervical or thoracic |
| | 62330 | Decompression, percutaneous, with partial removal of the ligamentum flavum, including laminotomy for access, epidurography, and imaging guidance (ie, CT or fluoroscopy), bilateral; one interspace, lumbar |
| | 62331 | Decompression, percutaneous, with partial removal of the ligamentum flavum, including laminotomy for access, epidurography, and imaging guidance (ie, CT or fluoroscopy), bilateral; additional interspace(s), lumbar (List separately in addition to code for primary procedure) |
| **HCPCS** | | |
| | C2614 | Probe, percutaneous lumbar discectomy |
| **Type of Service** | Surgery | |
| **Place of Service** | Inpatient/Outpatient | |

## POLICY HISTORY

| Date | Action | Action |
|---|---|---|
| July 2025 | Annual Review | Policy Renewed |
| July 2024 | Annual Review | Policy Renewed |
| July 2023 | Annual Review | Policy Revised - content moved from retired policy "Miscellaneous Surgical Treatments of Back Pain" |
| July 2022 | Annual Review | Policy Revised |
| January 2022 | Interim Review | Policy Revised |
| July 2021 | Annual Review | Policy Revised |
| July 2020 | Annual Review | Policy Revised |
| October 2019 | Interim Review | Policy Revised |
| July 2019 | Annual Review | Policy Revised |
| July 2018 | Annual Review | Policy Revised |
| July 2017 | Annual Review | Policy Revised |
| July 2016 | Annual Review | Policy Revised |
| October 2015 | Interim Review | Policy Revised |
| August 2015 | Annual Review | Policy Revised |
| September 2014 | Annual Review | Policy Revised |
| October 2013 | Annual Review | Policy Revised |
| November 2012 | Annual Review | Policy Renewed |
| November 2011 | Annual Review | Policy Renewed |
| October 2010 | Annual Review | Policy Renewed |

## APPENDIX

### 2018 Clinical Input

## Objective

Clinical input was sought to help determine whether the use of automated percutaneous discectomy or endoscopic percutaneous discectomy for individuals with herniated intervertebral discs would provide a clinically meaningful improvement in net health outcome and whether the use is consistent with generally accepted medical practice.

## Respondents

Clinical input was provided by the following specialty societies and physician members identified by a specialty society or clinical health system:

- American Association of Neurological Surgeons / Congress Neurological Surgeons (AANS/CNS) Joint Section on Disorders of the Spine and Peripheral Nerves
- North American Spine Society (NASS) & American Academy of Orthopaedic Surgeons (AAOS)
- Anonymous, MD, Neurosurgery, identified by an academic medical center

Clinical input provided by the specialty society at an aggregate level is attributed to the specialty society. Clinical input provided by a physician member designated by a specialty society or health system is attributed to the individual physician and is not a statement from the specialty society or health system. Specialty society and physician respondents participating in the Evidence Street® clinical input process provide review, input, and feedback on topics being evaluated by Evidence Street. However, participation in the clinical input process by a specialty society and/or physician member designated by a specialty society or health system does not imply an endorsement or explicit agreement with the Evidence Opinion published by BCBSA or any Blue Plan.

## Ratings

## Respondent Profile

**Appendix Table 1. Respondent Profile**

| | | **Specialty Society** | | | |
|---|---|---|---|---|---|
| *No.* | *Name of Organization* | | *Clinical Specialty* | | |
| 1 | American Association of Neurological Surgeons / Congress Neurological Surgeons (AANS/CNS) Joint Section on Disorders of the Spine and Peripheral Nerves | | Neurological Surgery | | |
| 2 | North American Spine Society (NASS) & American Academy of Orthopaedic Surgeons (AAOS) | | Spine Surgery & Orthopaedics | | |
| | Physician | | | | |
| *No.* | *Name* | *Degree* | *Institutional Affiliation* | *Clinical Specialty* | *Board Certification and Fellowship Training* |

| | | | | | |
|---|---|---|---|---|---|
| | | **Specialty Society** | | | |
| Identified by Academic Medical Center | | | | | |
| 3 | Anonymous | MD | Academic medical center | Neurosurgery | American Board of Neurological Surgery |

## Respondent Conflict of Interest Disclosure

### Appendix Table 2. *Respondent* Conflict of Interest Disclosure

| No. | 1. Research support related to the topic where clinical input is being sought | | 2. Positions, paid or unpaid, related to the topic where clinical input is being sought | | 3. Reportable, more than$1000, healthcare-related assets or sources of income for myself, my spouse, or my dependent children related to the topic where clinical input is being sought | | 4. Reportable, more than $350, gifts or travel reimbursements for myself, my spouse, or my dependent children related to the topic where clinical input is being sought | |
|---|---|---|---|---|---|---|---|---|
| | **Yes/ No** | **Explanation** | **Yes/No** | **Explanation** | **Yes/No** | **Explanation** | **Yes/ No** | **Explanation** |
| 1 | No | | No | | No | | No | |
| 3 | No | | No | | No | | No | |
| No. | Conflict of Interest Policy Statement | | | | | | | |
| 1 | Payor Response Committee of the AANS/CNS Joint Section on Disorders of the Spine and Peripheral Nerves provided input to the response. | | | | | | | |
| 2 | The North American Spine Society (NASS) employs rigorous checks and balances to ensure that its comments and recommendations on payors' coverage policies/clinical evidence reports are scientifically sound and unbiased. These checks and balances include requiring all individuals involved in drafting, reviewing, revising and approving the comments to disclose any conflicts of interest he or she may have. Using an evidence-based approach when possible, the multi-disciplinary team works together to develop the comments which requires multiple levels of review. The individuals who provide the final reviews and approvals are further required to divest themselves of most financial interests in any medical industry-related concerns. For more information on NASS' Level 1 disclosure policy, please visit NASS website: https://www.spine.org/Documents/WhoWeAre/PolicyCOILeadershipPositions.pdf | | | | | | | |

Individual physician respondents answered at individual level. Specialty Society respondents provided aggregate information that may be relevant to the group of clinicians who provided input to the Society-level response.

## Responses

- We are seeking your opinion on whether using the interventions for the below indications provide a clinically meaningful improvement in net health outcome. Please respond based on the evidence and your clinical experience. Please address these points in your response:
- Relevant clinical scenarios (e.g., a chain of evidence) where the technology is expected to provide a clinically meaningful improvement in net health outcome;
- Any relevant patient inclusion/exclusion criteria or clinical context important to consider in identifying individuals for this indication;
- Supporting evidence from the authoritative scientific literature (please include PMID).

- Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s)

| No | Rationale |
|---|---|
| 1 | Automated percutaneous lumbar discectomy is an appropriate treatment option for the highly selected patient who has a small focal disc fragment compressing a lumbar nerve causing radiculopathy in the absence of lumbar stenosis or severe bony foraminal stenosis. The success rate is less than for traditional lumbar discectomy at 75%, and is less effective in patients with free fragments or stenosis. This procedure should be performed only by surgeons who are appropriately trained in both percutaneous and open lumbar surgery.<br>• Helms CA, Onik, G, Davis GW. Automated percutaneous lumbar discectomy. *Skeletal Radiol.* 1989;18(8):579-583. PMID 2609191 |
| 2 | There does not appear to be sufficient evidence to support the clinical use of automated percutaneous lumbar discectomy for individuals with herniated intervertebral disc(s). |
| 3 | We don't use this technology or method at our institution and don't believe it is superior to alternative approaches. |

- Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s)

| No | Rationale |
|---|---|
| 1 | Percutaneous endoscopic discectomy is a treatment option for patients who have a small focal disc herniation causing lumbar radiculopathy. It utilizes an endoscope that is placed through an image guided approach. It is only appropriate for patients in whom the pathology can be approached through an interlaminar approach, as it does not allow for any significant bone removal. Again, it should only be performed by surgeons who are facile and appropriately trained in this technique as well as open lumbar surgery. |
| 2 | Although, some studies report longer operative times, higher complication rates, and additional time for providers' to learn the technique, there is sufficient evidence to support clinical efficacy for percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s). Well conducted studies show equivalent or superior results compared to open microdiscectomy in terms of surgery time, hospital stay, return to work, patient satisfaction, and short as well as long term clinical results. |
| 3 | We don't use this technology or method at our institution. We aren't convinced that it is superior to an open or MIS procedure involving use of the microscope. |

- Based on the evidence and your clinical experience for each of the clinical indications described below:
  - Respond Yes or No for each clinical indication whether the intervention would be expected to provide a clinically meaningful improvement in net health outcome; AND
  - Rate your level of confidence in your Yes or No response using the 1 to 5 scale outlined below.

| No. | Indications | Yes/ No | Low Confidence | | Intermediate Confidence | | High Confidence |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |

| No. | Indications | Yes/ No | Low Confidence | | Intermediate Confidence | | High Confidence |
|---|---|---|---|---|---|---|---|
| 1 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | X | | | | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | Yes | X | | | | |
| 2 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | | | | X | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | Yes | | | | | X |
| 3 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | | | | X | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | No | | | X | | |

- Based on the evidence and your clinical experience for each of the clinical indications described below:
    - Respond Yes or No for each clinical indication whether this intervention is consistent with generally accepted medical practice; AND
    - Rate your level of confidence in your Yes or No response using the 1 to 5 scale outlined below.

| No. | Indications | Yes/ No | Low Confidence | | Intermediate Confidence | | High Confidence |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| 1 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | Yes | X | | | | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | Yes | X | | | | |
| 2 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | | | | X | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | Yes | | | | | X |
| 3 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | | | | X | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | No | | | X | | |

- Based on the evidence and your clinical experience for the clinical indications described below:
    - Respond Yes or No whether this intervention may be expected to provide similar or better improvement in the net health outcome compared with use of microscopic discectomy; AND

- Rate your level of confidence in your Yes or No response using the 1 to 5 scale outlined below.

| No. | Indications | Yes/ No | Low Confidence | | Intermediate Confidence | | High Confidence |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| 1 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | X | | | | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | No | X | | | | |
| 2 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | | | | X | |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | Yes | | | | | X |
| 3 | Use of automated percutaneous discectomy for individuals with herniated intervertebral disc(s) | No | | | | | X |
| | Use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s) | No | | | | X | |

- With regard to the use of percutaneous endoscopic discectomy for individuals with herniated intervertebral disc(s),
    - Please indicate which terminology most appropriately describes this procedure:
        - Percutaneous endoscopic discectomy
        - Endoscopic discectomy
        - Other, please describe in text box.

| No. | Most Appropriate Terminology | Comment |
|---|---|---|
| 1 | Percutaneous endoscopic discectomy | |
| 2 | Percutaneous endoscopic discectomy | |
| 3 | Percutaneous endoscopic discectomy | |

- Does using an endoscopic approach to discectomy provide direct visualization similar to microdiscectomy?
    - Are there advantages to using an endoscopic approach to discectomy?

| No. | (b)Yes/ No | (c)Yes/No | Comments related to 5b or 5c |
|---|---|---|---|
| 1 | Yes | Yes | There are several different systems on the market, which utilize different types of endoscopic cameras, some being uniportal, some biportal. It is not possible to directly compare the visualization of each system to a microscope in this setting.Any given |

| No. | (b)Yes/No | (c)Yes/No | Comments related to 5b or 5c |
|---|---|---|---|
| | | | surgeon should utilize the visualization that he or she feels most appropriate for any given surgery, whether it is microscope, endoscope or loupe visualization. |
| 2 | Yes | NR | Patient reported outcomes have been shown to be similar for open microdiscectomy and endoscopic discectomy. |
| 3 | Yes | No | We are not convinced the endoscope provides clinically meaningful superior visualization compared to a microscope. |

- NR: not reported.

Additional narrative rationale or comments regarding clinical pathway and/or any relevant scientific citations (including the PMID) supporting your clinical input on this topic.

| No | Additional Comments |
|---|---|
| 1 | Surgeons may use the most appropriate tools at their disposal including visualization tools, such as endoscope, microscope or loupes, to achieve the best possible result in a given clinic circumstance in that surgeon's hands. While one surgeon may feel that a microscopic discectomy might be better than an endoscopic discectomy in a given patient, it is up to each individual surgeon to decide what he feels is the most appropriate for a specific patient in a specific setting. |
| 2 | Attached please find NASS Coverage Recommendations for Endoscopic Decompression for your reference and use.<br><br>An excerpt from NASS Coverage Recommendations is included below to provide additional clarification on various approaches for Endoscopic Discectomy:<br>• This policy covers the diagnosis of lumbar disc herniation and lumbar stenosis unresponsive to appropriate non-operative treatment. The indications are the same as those for other open or minimally invasive methods of lumbar decompression. The procedures discussed in this policy are endoscopic visualization and removal of lumbar disc herniation via transforaminal or interlaminar approach and endoscopic decompression of lumbar stenosis. This is distinguished from open or other forms of minimally invasive decompression in that the operative field is not visualized with the naked eye but rather through an endoscope projected onto a monitor.<br>• It is important to note that this policy does NOT address percutaneous disc decompression, intradiscal endoscopic decompression, thermal annuloplasty, intradiscal electrothermal annuloplasty (IDET) or biacuplasty.<br>Also, the following citations will be provided to BCBSA:<br>• Phan K., Xu J, Schultz K, et al. Full-endoscopic versus micro-endoscopic and open discectomy: A systematic review and meta-analysis of outcomes and complications. *Clin Neurol Neurosurg*. Mar 2017;154:1-12. PMID 28086154<br>• Li XC, Zhong CF, Deng GB, et al. Full-Endoscopic Procedures Versus Traditional Discectomy Surgery for Discectomy: A Systematic Review and Meta-analysis of Current Global Clinical Trials. *Pain Physician*. Mar 2016;19(3):103-18. PMID 27008284<br>• Cong L, Zhu Y, Tu G. A meta-analysis of endoscopic discectomy versus open discectomy for symptomatic lumbar disk herniation. *Eur Spine J*. Jan 2016;25(1):134-43. PMID 25632840<br>• Teli M, Lovi A, Brayda-Bruno M, et al. Higher risk of dural tears and recurrent herniation with lumbar micro-endoscopic discectomy. *Eur Spine J*. Mar 2010;19(3):443-50. PMID 20127495<br>• Garg B, Nagraja UB, Jayaswal A. Microendoscopic versus open discectomy for lumbar disc herniation: a prospective randomised study. *J Orthop Surg (Hong Kong)*. Apr 2011;19(1):30-4. PMID 21519072 |

| No | Additional Comments |
|---|---|
| | • Gibson J, Subramanian AS, Scott CEH. A randomised controlled trial of transforaminal endoscopic discectomy vs microdiscectomy. *Eur Spine J*. Mar 2017;26(3):847-856. PMID 27885470<br>• Hussein M, Abdeldayem A, Mattar MM. Surgical technique and effectiveness of microendoscopic discectomy for large uncontained lumbar disc herniations: a prospective, randomized, controlled study with 8 years of follow-up. *Eur Spine J*. Sep 2014;23(9):1992-9. PMID 24736930 |
| 3 | The review that was provided addresses all of the relevant issues in a comprehensive fashion. |

- Is there any evidence missing from the attached draft review of evidence that demonstrates clinically meaningful improvement in net health outcome?

| No | Yes/ No | Citations of Missing Evidence |
|---|---|---|
| 1 | No | |
| 2 | No | |
| 3 | No | |

New information or technology that would be relevant for Wellmark to consider when this policy is next reviewed may be submitted to:

Wellmark Blue Cross and Blue Shield
Medical Policy Analyst
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Des Moines, IA 50306-9232

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