OVERVIEW:
This guideline outlines the key surgical treatments and indications for common cervical spinal disorders and is a consensus document based upon the best available evidence. Spine surgery is a complex area of medicine, and this document breaks out the clinical indications by surgical type. Operative treatment is indicated only when the natural history of an operatively treatable problem is better than the natural history of the problem without operative treatment. Choice of surgical approach is based on anatomy, the patient’s pathology, and the surgeon’s experience and preference. All operative interventions must be based on a positive correlation with clinical findings, the natural history of the disease, the clinical course, and diagnostic tests or imaging results.

INDICATIONS FOR CERVICAL SPINE SURGERY:

A. Anterior Cervical Decompression with Fusion (ACDF)— Single Level
Anterior cervical discectomy and fusion with either a bone bank allograft or autograft with or without plating is the standard approach anteriorly and is most commonly used for disc herniation. The following criteria must be met*:

- Positive Clinical Findings of Myelopathy with evidence of progressive neurologic deficits consistent with worsening spinal cord compression— immediate surgical evaluation is indicated. Symptoms may include:
  - upper extremity weakness
  - unsteady gait related to myelopathy/balance or generalized lower extremity weakness
  - disturbance with coordination
  - hyperreflexia
  - Hoffmann sign
  - positive Babinski sign;

OR
Progressive neurological deficit (motor deficit, bowel or bladder dysfunction) with evidence of spinal cord or nerve root compression on Magnetic Resonance Imaging (MRI) or Computed Tomography (CT) imaging—immediate surgical evaluation is indicated.

OR

When All of the following criteria are met:

- Cervical radiculopathy or myelopathy from ruptured disc, spondylosis, spinal instability, or deformity: **AND**
- Persistent or recurrent symptoms/pain with functional limitations that are unresponsive to at least 6 weeks of conservative treatment: **AND**
- Imaging studies confirm the presence of spinal cord or spinal nerve root compression (disc herniation or foraminal stenosis) at the level corresponding with the clinical findings. Imaging studies may include:
  - MRI (preferred study for assessing cervical spine soft tissue): **OR**
  - CT with or without myelography—indicated in patients in whom MRI is contraindicated; preferred for examining bony structures; or in patients presenting with clinical symptoms or signs inconsistent with MRI findings (e.g., foraminal compression not seen on MRI)

*Cervical spine decompression with fusion as first-line treatment without conservative care measures* in the following clinical cases:

- As outlined above for myelopathy or progressive neurological deficit scenarios.
- Significant spinal cord or nerve root compression due to tumor, infection or trauma.
- Fracture or instability on radiographic films measuring:
  - Sagittal plan angulation of greater than 11 degrees at a single interspace greater than 3.5mm anterior subluxation in association with radicular / cord dysfunction **OR**
  - Subluxation at the (C1) level of the atlantodental interval of more than 3 mm in an adult and 5 mm in a child

**Not Recommended:**

- In asymptomatic or mildly symptomatic cases of cervical spinal stenosis.
- In cases of neck pain alone, without neurological deficits, and no evidence of significant spinal nerve root or cord compression on MRI or CT.  See E. Cervical Fusion for Treatment of Axial Neck Pain Criteria

**B. Anterior Cervical Decompression with Fusion (ACDF)—Multiple Level**

Anterior cervical discectomy and fusion with either a bone bank allograft or autograft with or without plating is the standard approach anteriorly and is most commonly used for disc herniation. The following criteria must be met*:

- Positive Clinical Findings of Myelopathy with evidence of progressive neurologic deficits consistent with worsening spinal cord compression—immediate surgical evaluation is indicated. Symptoms may include:
  - upper extremity weakness
  - unsteady gait related to myelopathy/balance or generalized lower extremity weakness
  - disturbance with coordination
  - hyperreflexia
- Hoffmann sign
- positive Babinski sign;

OR
- Progressive neurological deficit (motor deficit, bowel or bladder dysfunction) with corresponding evidence of spinal cord or nerve root compression on an MRI or CT scan images — immediate surgical evaluation is indicated.

OR
- **When ALL of the following criteria are met:**
  - Cervical radiculopathy or myelopathy due to ruptured disc, spondylosis, spinal instability, or deformity; **AND**
  - Persistent or recurrent pain/symptoms are unresponsive to **at least 6 weeks** of conservative treatment; **AND**
  - Imaging studies confirm the presence of spinal cord or spinal nerve root compression (disc herniation or foraminal stenosis) **at multiple levels corresponding with the clinical findings.** Imaging studies may include any of the following:
    - MRI (preferred study for assessing cervical spine soft tissue); **OR**
    - CT with or without myelography — indicated in patients in whom MRI is contraindicated; preferred for examining bony structures; or in patients presenting with clinical symptoms or signs inconsistent with MRI findings (e.g., foraminal compression not seen on MRI)

* Cervical spine decompression with fusion performed as **first-line treatment without** conservative care measures in the following clinical cases:
  - As outlined above for myelopathy or progressive neurological deficit scenarios.
  - Significant spinal cord or nerve root compression due to tumor, infection or trauma.
  - Fracture or instability on radiographic films measuring:
    - Sagittal plan angulation of greater than 11 degrees at a single interspace greater than 3.5mm anterior subluxation in association with radicular / cord dysfunction; **OR**
    - Subluxation at the (C1) level of the atlantodental interval of more than 3 mm in an adult and 5 mm in a child.

Not Recommended:
- In asymptomatic or mildly symptomatic cases of cervical spinal stenosis.
- In cases of neck pain alone, without neurological deficits, and no evidence of significant spinal nerve root or cord compression on MRI or CT. See E. Cervical Fusion for Treatment of Axial Neck Pain Criteria.

C. **Cervical Posterior Decompression with Fusion — Single Level**
Surgical indications for cervical spine stenosis/cervical spondylotic myelopathy (CSM) must meet the following criteria*:
- Positive Clinical Findings of Myelopathy with evidence of progressive neurologic deficits consistent with worsening **spinal cord compression** — immediate surgical evaluation is indicated. Symptoms may include:
  - upper extremity weakness
  - unsteady gait related to myelopathy/balance or generalized lower extremity weakness
- disturbance with coordination
- hyperreflexia
- Hoffmann sign
- positive Babinski sign:

OR
- Progressive neurological deficit (motor deficit, bowel or bladder dysfunction) with corresponding evidence of spinal cord or nerve root compression on an MRI or CT scan images — immediate surgical evaluation is indicated.

OR
- When ALL of the following criteria are met:
  - Cervical radiculopathy or myelopathy from ruptured disc, spondylosis, spinal instability, or deformity; AND
  - Persistent or recurrent symptoms/pain with functional limitations that is unresponsive to at least 6 weeks of conservative treatment; AND
  - Imaging studies confirm the presence of spinal cord or spinal nerve root compression (disc herniation or foraminal stenosis) at single level corresponding with the clinical findings. Imaging studies may include:
    - MRI (preferred study for assessing cervical spine soft tissue); OR
    - CT with or without myelography—in indicated in patients in whom MRI is contraindicated; preferred for examining bony structures; or in patients presenting with clinical symptoms or signs inconsistent with MRI findings (e.g., foraminal compression not seen on MRI): AND
  - Single level symptomatic cervical disease as evidence by:
    - cervical spinal stenosis due to Cervical spondylotic myelopathy (CSM); or
    - cervical spinal stenosis due to Ossification of the posterior longitudinal ligament (OPLL); or
    - single level spinal cord or nerve root compression due to herniated disc

* Cervical spine decompression with fusion performed as first-line treatment without conservative care measures in the following clinical cases:
  - As outlined above for myelopathy or progressive neurological deficit scenarios.
  - Significant spinal cord or nerve root compression due to tumor, infection or trauma.
  - Fracture or instability on radiographic films measuring:
    - Sagittal plan angulation of greater than 11 degrees at a single interspace greater than 3.5mm anterior subluxation in association with radicular / cord dysfunction: OR
    - Subluxation at the (C1) level of the atlantodental interval of more than 3 mm in an adult and 5 mm in a child.

Not Recommended:
- In asymptomatic or mildly symptomatic cases of cervical spinal stenosis.
- In cases of neck pain alone, without neurological deficits, and no evidence of significant spinal nerve root or cord compression on MRI or CT. See E. Cervical Fusion for Treatment of Axial Neck Pain Criteria.
- In patients with kyphosis or at risk for development of postoperative kyphosis.

D. Cervical Posterior Decompression with Fusion—Multiple Levels
Surgical indications for cervical spine stenosis/cervical spondylotic myelopathy (CSM) must meet the following criteria*:

- **Positive Clinical Findings of Myelopathy** with evidence of progressive neurologic deficits consistent with worsening **spinal cord compression**—immediate surgical evaluation is indicated. Symptoms may include:
  - upper extremity weakness
  - unsteady gait related to myelopathy/balance or generalized lower extremity weakness
  - disturbance with coordination
  - hyperreflexia
  - Hoffmann sign
  - positive Babinski sign;

OR

- Progressive neurological deficit (motor deficit, bowel or bladder dysfunction) with corresponding evidence of spinal cord or nerve root compression on an MRI or CT scan images—immediate surgical evaluation is indicated.

OR

- **When ALL of the following criteria are met:**
  - Cervical radiculopathy or myelopathy from ruptured disc, spondylosis, spinal instability, or deformity: **AND**
  - Persistent or recurrent symptoms/pain with functional limitations that is unresponsive to at least **6 weeks of conservative treatment**: **AND**
  - Imaging studies indicate significant spinal cord or spinal nerve root compression at **multiple levels corresponding with the clinical findings**. Imaging studies may include:
    - MRI (preferred study for assessing cervical spine soft tissue); OR
    - CT with or without myelography—indicated in patients in whom MRI is contraindicated: preferred for examining bony structures; or in patients presenting with clinical symptoms or signs inconsistent with MRI findings (e.g., foraminal compression not seen on MRI); **AND**
  - **Multilevel (>=2) symptomatic cervical disease as evidence by:**
    - cervical spinal stenosis due to cervical spondylotic myelopathy (CSM); or
    - cervical spinal stenosis due to ossification of the posterior longitudinal ligament (OPLL); or
    - evidence of significant spinal cord or nerve root compression from herniated discs at two or more levels.

* **Cervical spine decompression with fusion performed as first-line treatment without conservative care measures in the following clinical cases:**
  - As outlined above for myelopathy or progressive neurological deficit scenarios.
  - Significant spinal cord or nerve root compression due to tumor, infection or trauma.
  - Fracture or instability on radiographic films measuring:
o Sagittal plan angulation of greater than 11 degrees at a single interspace greater than 3.5mm anterior subluxation in association with radicular / cord dysfunction; OR
o Subluxation at the (C1) level of the atlantodental interval of more than 3 mm in an adult and 5 mm in a child.

Not Recommended:
- In asymptomatic or mildly symptomatic cases of cervical spinal stenosis.
- In cases of neck pain alone, without neurological deficits, and no evidence of significant spinal nerve root or cord compression on MRI or CT. See E. Cervical Fusion for Treatment of Axial Neck Pain Criteria.
- In patients with kyphosis or at risk for development of postoperative kyphosis.

E. Cervical Fusion for Treatment of Axial Neck Pain: In patients with non-radiculocervical pain for whom fusion is being considered, **ALL of the following criteria must be met:**

- Improvement of the symptoms has failed or plateaued, and the residual symptoms of pain and functional disability are unacceptable at the end of **6 to 12 consecutive months of active treatment**, or at the end of longer duration of non-operative programs for debilitated patients with complex problems [NOTE: Mere passage of time with poorly guided treatment is not considered an active treatment program]; **AND**
- All pain generators are adequately defined and treated; **AND**
- All physical medicine and manual therapy interventions are completed; **AND**
- X-ray, MRI, or CT demonstrating disc pathology or spinal instability; **AND**
- Spine pathology limited to one or two levels unless other complicating factors are involved; **AND**
- Psychosocial evaluation for confounding issues addressed.

**NOTE:** The effectiveness of three-level or greater cervical fusion for non-radiculocervical pain has not been established.

F. Cervical Posterior Decompression
Surgical indications for cervical nerve root decompression due to radiculopathy, disc herniation or foraminal stenosis. A posterior laminotomy and discectomy is occasionally used for patients with specific lateral disc herniations when the surgeon's preference is that the individual would respond better with a posterior approach than an anterior one.

**The following criteria must be met:**
- Positive Clinical Findings of Myelopathy with evidence of progressive neurologic deficits consistent with worsening spinal cord compression—immediate surgical evaluation is indicated. Symptoms may include:
  - upper extremity weakness
  - unsteady gait related myelopathy/balance or generalized lower extremity weakness
  - disturbance with coordination
  - hyperreflexia
• Hoffmann sign
• positive Babinski sign:

OR
• Progressive neurological deficit (motor deficit, bowel or bladder dysfunction) with corresponding evidence of spinal cord or nerve root compression on an MRI or CT scan images — immediate surgical evaluation is indicated.

OR
• When ALL of the following criteria are met:
  o Cervical radiculopathy from ruptured disc, spondylosis, or deformity: AND
  o Persistent or recurrent symptoms/pain with functional limitations that is unresponsive to at least 6 weeks of conservative treatment: AND
  o Imaging studies confirm the presence of spinal cord or spinal nerve root compression at the level(s) corresponding with the clinical findings. Imaging studies may include any of the following:
    − MRI (preferred study for assessing cervical spine soft tissue); OR
    − CT with or without myelography — indicated in patients in whom MRI is contraindicated; preferred for examining bony structures; or in patients presenting with clinical symptoms or signs inconsistent with MRI findings (e.g., foraminal compression not seen on MRI);

* Cervical decompression performed as first-line treatment without conservative care in the following clinical cases:
  • As outlined above for myelopathy or progressive neurological deficit scenarios.
  • Spinal cord or nerve root compression due to tumor, infection or trauma.

Not Recommended:
• In asymptomatic or mildly symptomatic cases.
• In cases of pain alone, without neurological deficits and abnormal imaging findings. See E. Cervical Fusion for Treatment of Axial Neck Pain Criteria.

G. Cervical Artificial Disc
This involves the insertion of a prosthetic device into the cervical intervertebral space with the goal of maintaining physiologic motion at the treated cervical segment. The use of artificial discs in motion-preserving technology is based on the surgeon's preference and training. Only FDA-approved artificial discs are appropriate.

Indications for artificial cervical disc replacement are as follows:
• Skeletally mature patient: AND
• Patient has intractable radiculopathy caused by single level herniated disc located at C3-C7: AND
• Patient symptoms are not responsive to 6 weeks of conservative care treatment: AND
• Imaging studies confirm the presence of compression at the level corresponding with the clinical findings (MRI or CT): AND
• No prior neck surgery: AND
• Use of an FDA-approved prosthetic intervertebral discs
NOTE: CPT codes for Cervical Artificial Disc Replacement - Multiple Level (22858 and 0375T) are not a covered service and are not reimbursable.

**Cervical Artificial Disc Replacement is NOT indicated when any of the following clinical scenarios exists:**

- Symptomatic multiple level disease
- Adjacent Level Disease: degenerative disease adjacent to a previous cervical fusion
- Infection (at site of implantation or systemic)
- Osteoporosis or osteopenia
- Instability
  - Translation greater than 3mm difference between lateral flexion-extension views at the symptomatic levels;
  - 11 degrees of angular difference between lateral flexion-extension views at the symptomatic levels
- Sensitivity or allergy to implant materials
- Severe spondylosis defined as:
  - > 50% disc height loss compared to minimally or non-degenerated levels; OR
  - Bridging osteophytes; OR
  - Absence of motion on lateral flexion-extension views at the symptomatic site
- Severe facet arthropathy
- Ankylosing spondylitis
- Rheumatoid Arthritis
- Previous Fracture with anatomical deformity
- Ossification of the posterior longitudinal ligament (OPLL)
- Active Cervical Spine Malignancy

**H. Cervical Fusion without Decompression**

Cervical fusion without decompression will be reviewed on a **case-by-case basis**. Atraumatic instability due to Down Syndrome-related spinal deformity, rheumatoid arthritis, or Basilar invagination are uncommon, but may require cervical fusion.

**I. Cervical Anterior Decompression (without fusion)**

All requests for anterior decompression without fusion will be reviewed on a **case-by-case basis**.

**ADDITIONAL INFORMATION:**

A comprehensive assimilation of factors should lead to a specific diagnosis with positive identification of the pathologic condition(s).

- Early intervention may be required in acute incapacitating pain or in the presence of progressive neurological deficits.
- Operative treatment is indicated when the natural history of surgically treated lesions is better than the natural history for non-operatively treated lesions.
- Patients may present with localized pain or severe pain in combination with numbness, extremity weakness, loss of coordination, gait issues, or bowel and
bladder complaints. Nonoperative treatment continues to play an important role in the care of patients with degenerative cervical spine disorders. If these symptoms progress to neurological deficits, from corresponding spinal cord or nerve root compression, than surgical intervention may be warranted.

- All patients being considered for surgical intervention should first undergo a comprehensive neuromusculoskeletal examination to identify those pain generators that may either respond to non-surgical techniques, or may be refractory to surgical intervention.
- If operative intervention is being considered, particularly those procedures that require a fusion, it is recommended that the person refrain from smoking for at least six weeks prior to surgery and during the time of healing.
- In situations requiring the possible need for operation, a second opinion may be necessary. Psychological evaluation is strongly encouraged when surgery is being performed for isolated axial pain to determine if the patient will likely benefit from the treatment.
- It is imperative for the clinician to rule out non-physiologic modifiers of pain presentation, or non-operative conditions mimicking radiculopathy, myelopathy or spinal instability (peripheral compressive neuropathy, chronic soft tissue injuries, and psychological conditions), prior to consideration of elective surgical intervention.

Degenerative cervical spine disorders, while often benign and episodic in nature, can become debilitating, resulting in axial pain and neurological damage to the spinal cord. Compression on the nerve root and / or spinal cord may be caused by (1) a herniated disc with or without extrusion of disc fragments and/or (2) degenerative cervical spondylosis.

**Anterior Approaches – Additional Information:**

- Anterior surgical approaches to cervical spine decompression emerged in the 1950s in response to technical limitations experienced with posterior approaches, including restricted access to and exposure of midline bony spurs and disc fragments.
- The first reports in the literature describe anterior cervical discectomy combined with a spinal fusion procedure (ACDF). Fusion was added to address concerns about potential for loss of spinal stability and disc space height, leading to late postoperative complications such as kyphosis and radicular pain (Sonntag and Klara, 1996; Dowd and Wirth, 1999; Matz et al., 2009a; Matz et al., 2009b; Denaro and Di Martino, 2011; Botelho et al., 2012; van Middelkoop et al., 2012).
- Anterior cervical fusion (ACF) accounted for approximately 80% of cervical spine procedures performed in the United States between 2002 and 2009, while posterior cervical fusion (PCF) accounted for 8.5% of these procedures (Oglesby et al., 2013).
- **Anterior Cervical Discectomy and Fusion (ACDF)** – removal of all or part of a herniated or ruptured disc or spondolytic bony spur to alleviate pressure on the nerve roots or on the spinal cord in patients with symptomatic radiculopathy. Discectomy is most often combined with fusion to stabilize the spine.

**Posterior Approaches**

- **Laminectomy** – removal of the bone between the spinal process and facet pedicle junction to expose the neural elements of the spine’ this allows for the inspection of the spinal canal, identification and removal of pathological tissue, and decompression of the cord and roots.
- **Laminoplasty** – the opening of the lamina to enlarge the spinal canal. There are several laminoplasty techniques; all aim to alleviate cord compression by reconstructing the spinal canal. Laminoplasty is commonly performed to decompress the spinal cord in patients with degenerative spinal stenosis.

- **Laminoforaminotomy (also known as posterior discectomy)** – the creation of a small window in the lamina to facilitate removal of arthritic bone spurs and herniated disc material pressing on the nerve root as it exits through the foramen. The procedure widens the opening of the foramen so that the nerve exits without being compressed.

**Key Primary CPT Codes:**
- 22548, 22551, 22554 - Cervical Anterior Decompression with Fusion – Single Level
- 22548, 22551, 22554, +22552, +22585 - Cervical Anterior Decompression with Fusion – Multiple Level
- 63001, 63015, 63020, 63040, 63045, 63050, 63051, +63035, +63043, +63048 - Cervical Posterior Decompression without Fusion
- 22590, 22595, 22600 - Cervical Posterior Decompression with Fusion – Single Level
- 22590, 22595, 22600, +22614 - Cervical Posterior Decompression with Fusion – Multiple Levels
- 22856, 22861, 22864, 0095T – Cervical Artificial Disc Replacement – Single Level
- 63075, +63076 – Cervical Anterior Decompression without Fusion
REFERENCES


**Fusion References**


