



# Medical Coverage Policy

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## Cervical Fusion

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### Overview

This Coverage Policy addresses cervical fusion, also referred to as cervical arthrodesis. Cervical fusion is a surgical procedure that joins two vertebral bones in the cervical spine. The procedure is performed to treat severe neck pain and disability, or instability of the cervical spine, and involves the use of bone graft materials and various types of instrumentation to join the vertebrae together. The cervical spine may be approached anteriorly or posteriorly, or use a combination of anterior-posterior approaches. In some instances, cervical fusion may be considered an alternative to cervical disc arthroplasty.

### Coverage Policy

#### ANTERIOR CERVICAL FUSION FOR DEGENERATIVE DISEASE

Single or multilevel anterior cervical discectomy and fusion (ACDF) is considered medically necessary for treatment of symptomatic degenerative disease when ALL of the following criteria are met:

- unremitting cervical radiculopathy and/or myelopathy (i.e., neck and arm pain) resulting in disability and/or neurological deficit that are refractory to at least six weeks of standard conservative, nonoperative management (e.g., reduced activities, exercise, analgesics, physical therapy), in the absence of progressive or severe myelopathy
- complex imaging studies (i.e., CT, MRI, X-ray) demonstrate at least ONE of the following at each impacted level being considered for the fusion:
  - Herniated nucleus pulposus
  - Spondylosis (i.e., presence of osteophytes)
  - Visible loss of disc height compared to adjacent levels with resultant foraminal stenosis
- physical examination findings and imaging studies correlate with each level being considered for the fusion

### **CERVICAL FUSION FOR INSTABILITY**

**Single or multilevel cervical fusion is considered medically necessary for ANY of the following indications when there is an associated spinal instability:**

- acute spinal fracture and/or dislocation
- neural compression after spinal fracture
- traumatic ligamentous disruption
- epidural compression, fracture or vertebral destruction from spinal tumor or cyst
- spinal tuberculosis
- spinal decompression or debridement for infection (e.g., discitis, osteomyelitis, epidural abscess)
- spinal decompression for myelopathy associated with ossification of the posterior longitudinal ligament
- spinal decompression for myelopathy associated with spondylosis in rheumatoid arthritis
- cervical spinal deformity associated with neurological symptoms of myelopathy or radiculopathy (e.g., sagittal plane angulation of more than 11 degrees between adjacent segments, spondylosis of >3.5 mm)
- as an adjunct to cyst excision of synovial facet cysts in the cervical spine
- posttraumatic cervical instability
- atlantoaxial instability (e.g., atlas and axis fracture, nonunion)
- treatment of cervical spine fracture/dislocation associated with acute cervical radiculopathy or myelopathy
- multilevel spondylotic myelopathy with kyphosis, when symptoms of myelopathy are present and imaging studies correlate with symptoms and demonstrates cord compression
- cervical instability from any ONE of the following:
  - Klippel-Feil syndrome
  - Down's syndrome
  - Skeletal dysplasia or connective tissue disorder

### **CERVICAL FUSION FOR IATROGENIC INSTABILITY**

**Cervical fusion is considered medically necessary for intraoperative iatrogenic spinal instability of the level or levels involved resulting from ANY of the following surgical procedures:**

- removal of 50% or more of the facets bilaterally
- removal of 75% or more of a single facet
- following cervical corpectomy\*, as part of a stabilization procedure

**\*Note:** Corpectomy is a procedure in which the at least 50% or more of the body of the vertebrae is removed.

### **POSTERIOR CERVICAL FUSION FOR INSTABILITY: SPINAL STENOSIS**

**Posterior cervical fusion is considered medically necessary for the treatment of spinal stenosis with laminectomy when ALL of the following criteria are met:**

- symptoms of myelopathy and/or radiculopathy
- failure of at least three (3) consecutive months of physician-supervised conservative medical-

- management including exercise, nonsteroidal and/or steroidal medication (unless contraindicated), physical therapy and activity lifestyle modification in the absence of progressive or severe myelopathy
- clinically significant functional impairment (e.g., inability to perform household chores or prolonged standing, interference with essential job functions)
- central, lateral recess, foraminal stenosis or synovial cyst is demonstrated on imaging studies (e.g., radiographs, magnetic resonance imaging [MRI], computerized tomography [CT], myelography) that correlates with the clinical symptoms and/or signs
- radiographic evidence of **EITHER** of the following:
  - subluxation or translation of more than 3.5 mm on static lateral views or dynamic radiographs
  - sagittal plane angulation of more than 11 degrees between adjacent segments

### **CERVICAL FUSION FOLLOWING PRIOR SPINAL SURGERY: WITHOUT SPONDYLOLISTHESIS**

**Cervical fusion is considered medically necessary for treatment of symptomatic adjacent or same segment stenosis following prior spinal surgery in the absence of spondylolisthesis, when ALL of the following criteria have been met:**

- unremitting pain and significant functional impairment for at least 3 months in the absence of myelopathy that persists despite structured\*, physician-supervised conservative medical management, which includes ALL of the following components
  - exercise, including core stabilization exercises
  - analgesics, nonsteroidal anti-inflammatory medication, unless contraindicated
  - physical therapy, including passive and active treatment modalities
  - activity/lifestyle modification
- physical examination findings and imaging studies correlate with each level being considered for the fusion

**\*Note:** Structured medical management consists of medical care that is delivered through regularly scheduled appointments, including follow-up evaluation, with licensed healthcare professionals.

### **CERVICAL FUSION FOLLOWING PRIOR SPINAL SURGERY: PSEUDOARTHROSIS**

**Cervical fusion is considered medically necessary for the treatment of pseudoarthrosis (i.e., nonunion of prior fusion) of the cervical spine at the same level(s) when it has been at least 12 months from the prior surgery and ALL of the following criteria are met:**

- mechanical neck pain that correlates to the level of the pseudoarthrosis
- imaging studies(e.g., radiographs, CT) confirm evidence of a pseudoarthrosis (e.g., lack of bridging bone, dynamic motion on flexion-extension radiographs)
- failure of three (3) consecutive months of physician-supervised conservative management which includes exercise, nonsteroidal and/or steroidal medications (unless contraindicated), physical therapy and activity lifestyle modification
- the individual is a nonsmoker†, or in the absence of progressive neurological compromise the individual has refrained from use of tobacco products for at least 6 weeks prior to the planned surgery

† **Note:** Use of tobacco products have been shown to adversely affect bone healing. Smoking is associated with an increased risk of pseudoarthrosis. As a result, when performed for other than emergent medical conditions Cigna requires a statement that the individual is a non-smoker or will refrain from use of tobacco products for at least six (6) weeks prior to the planned cervical fusion procedure for pseudoarthrosis.

### **CERVICAL FUSION NOT MEDICALLY NECESSARY**

**Cervical fusion is considered not medically necessary for the following indications:**

- posterior cervical fusion with initial primary laminectomy/discectomy for nerve root decompression or spinal stenosis in the absence of spondylolisthesis or kyphosis
- anterior or posterior cervical fusion for chronic axial neck pain

- posterior cervical fusion performed with laminectomy in the absence of kyphosis (e.g., degenerative spine) or subluxation/translation of more than 3.5 mm

**Isolated cervical facet fusion, with or without instrumentation, including facet joint implants and/or bone graft substitutes used exclusively as a stand-alone stabilization device is considered experimental, investigational or unproven.**

## General Background

Neck pain occurs in a majority of the population and typically involves more than one component of the spine, such as the vertebrae, intervertebral discs, spinal nerves, other anatomic structures such as ligaments, muscles, and joints. Conditions that frequently result in neck pain include soft tissue injury, trauma, infection, herniated disc, degenerative spine conditions, neoplastic conditions, and deformities such as kyphosis.

While the cause of neck pain is often multifactorial (e.g., originating from the vertebrae, discs, ligaments, tendons and muscles) the location of pain varies. Axial neck pain occurs along the spine, is of musculoskeletal or soft tissue origin, and is a non-radiating type of pain. The most common cause of axial neck pain is degenerative change to the cervical spine, which occurs as a natural consequence of aging. Radicular pain involves a nerve root, is due to nerve root compression, follows the nerve root distribution, and radiates to one or both upper extremities, and/or into the shoulder area. Radicular pain can include varying degrees of sensory, motor, and/or reflex changes related to nerve root(s) without evidence of myelopathy (North American Spine Society, [NASS], 2013). Myelopathy is a term that describes any neurological deficit related to the spinal cord and is often used to describe loss of function in the upper or lower extremities (NASS, 2013).

Depending on the cause of neck pain associated symptoms may include numbness, tingling, weakness, and other types of neurologic dysfunction in the presence of spinal cord compression. Conservative measures for treatment of neck pain include analgesics, muscle relaxants, local injections, physical therapy, cervical bracing and home exercise. Conservative treatment is often effective for alleviating symptoms and typically lasts six to eight weeks. However conservative therapy is not recommended in the presence of progressive neurological deficits, in the presence of unstable spinal fractures or dislocations, or for progressive spinal deformity. In the absence of progressive neurologic compromise, or when conservative management has been attempted and fails to relieve pain and disability, surgery may be required for conditions with underlying pathology confirmed by physical examination and radiological imaging.

When spinal cord compression is present surgical methods to relieve the pressure on the nerves is often necessary and is referred to as decompression surgery. Decompression typically includes surgical procedures such as discectomy (removal of the disc), laminectomy (removal of the lamina), corpectomy (removal of the vertebral body), or osteotomy (removal of a piece of bone). When performed, these procedures may result in spinal instability. As such, decompression is often performed as part of cervical fusion in order to regain stability of the spine. For example, anterior cervical fusion is usually performed with decompression. Posterior cervical fusion is typically performed with stabilization (using rods, screws) although may be performed with decompression in some instances (NASS, 2014). Instability of the cervical spine can also result from trauma and/or disease, or a combination of all (White, Panjabi, 1980), which may or may not require a decompression. Instability of the cervical spine has been defined by White, Panjabi (1980) is well-accepted in the medical literature as sagittal plane translation of >3.5 mm, and/or rotation between motion segments of 11°, in addition to other notable factors such as destruction of elements or inability to function, a positive stretch test, spinal cord or nerve root damage, and abnormal disc narrowing (White, Panjabi, 1980). In the absence of instability, evidence in the published peer-reviewed scientific literature does not provide strong support that when used for this indication cervical fusion is clinically effective for reducing pain and disability.

While there is no consensus regarding the length of conservative management required prior to undergoing surgical treatment for neck pain, there is some evidence to suggest that a longer duration of symptoms preoperatively may be related to worse outcomes following surgery (Burneikiene, et al., 2015; Enquist, et al., 2015). In addition, cognitive behavioral therapy should be included as part of multidisciplinary rehabilitation for individuals seeking treatment of cervical radiculopathy (Bono, et al., 2011; Persson, et al., 1997).

Cervical spinal fusion is in many situations an elective surgery, therefore it is strongly recommended that individuals be in the best physical condition prior to undergoing surgery. It is well-established that smoking is a preventable cause of morbidity and mortality. Tobacco use in particular is considered a risk factor for poor healing and has been associated with nonunion. Particularly with spinal fusion, tobacco use has been associated with increased risk of pseudoarthrosis (Brown, et al., 1986). Furthermore, the American Academy of Orthopedic Surgeons (AAOS) strongly recommends avoiding use and exposure to tobacco products due to the severe and negative impact on the musculoskeletal system (i.e., bones, muscle, tendons, ligaments) (AAOS, 2010).

Although evidence in the peer-reviewed published literature is limited to retrospective case series, systematic reviews and few prospective trials, the evidence does suggest smoking is at least one factor that adversely affects fusion rates following cervical fusion (An, et al., 1995; Bishop, et al, 1996; Hilibrand, et al., 2001; Lau, et al., 2014, Jackson, Devine, 2016; Berman et al., 2017; Hofler, et al., 2018). In 1996 Bishop and colleagues reported higher rates of nonunion, delayed union and disc space collapse in smokers, particularly in those who underwent ACDF using allograft, compared to autograft. In 2001 Hilibrand and colleagues compared long term radiographic and clinical results of smokers versus non smokers who had undergone arthrodesis using autogenous bone graft following multi-level anterior cervical decompression for the treatment of cervical radiculopathy or myelopathy, or both. In this study group the authors reported that in addition to factors such as the use of allograft bone, multilevel interbody grafting, and interbody grafting next to a solid fusion, smoking adversely affected clinical outcomes (Hilibrand et al., 2001). Lau et al. published the results of a retrospective case series involving 160 subjects who underwent anterior cervical corpectomy: 49.4% were nonsmokers, 25.6% were quitters, and 25% were current smokers. The authors reported current smoking status was significantly associated with a higher complication rate ( $p < 0.001$ ) and longer length of stay ( $p < 0.001$ ). In addition, (although not statistically significant) current smokers had higher rates of pseudoarthrosis (16%) compared with quitters (8.1%) and nonsmokers (4.3%) one year post procedure (Lau, et al., 2014). In 2016 Jackson and Devine published a systematic review of four retrospective comparative trials evaluating the effects of smoking and smoking cessation on spine surgery and concluded current smokers are significantly more likely to experience pseudoarthrosis and postoperative infection and to report lower clinical outcomes after surgery in both the cervical and lumbar spines (Jackson, Devine, 2016). Hofler et al (2018) reported the results of a study evaluating risk factors for symptomatic pseudoarthrosis using an inpatient database of patients who underwent new spinal fusion between 2009 and 2011. Generalized linear mixed effects models were used to estimate the odds of experiencing postoperative pseudoarthrosis as a function of multivariate patient characteristics, comorbidities and surgical approach. For cervical fusion there were 107,420 patients of which 1.2% (1295) developed a pseudoarthrosis. The risk factors associated with pseudoarthrosis included posterior approach, combined approach, fusion of > 9 vertebrae, smoking, and long term steroid use. The authors concluded several conditions were strongly associated with pseudoarthrosis, although additional studies are needed to establish causation. While various risk factors may be associated with increased risk of pseudoarthrosis, and some authors have reported no difference in fusion rates among smokers/nonsmokers (Eubanks, et al., 2011; Luszczuk, et al., 2013) cessation of smoking prior to surgery for a failed union is recommended.

Psychological assessment and treatment as part of a multidisciplinary approach to conservative pain management is recommended. Risk factors, such as drug or alcohol abuse and depression may act as a barrier to recovery following spinal fusion (Washington State Department of Labor and Industries, 2002; Hanley, David, 1999; Tang, et al., 2001). Authors have recommended psychological screening, and treatment if applicable, of patients with neck and/or back pain prior to surgery for identification of risk factors that may be associated with chronic disability.

### **Indications**

Cervical fusion is generally performed in combination with procedures aimed at either restabilizing the spine or decompressing the nerve. Conditions for which cervical fusion has been proposed and has resulted in improved clinical outcomes include conditions resulting in cervical instability (i.e., infection, tumor, trauma, non-traumatic, iatrogenic), cervical radiculopathy from degenerative disorders, clinical myelopathy (i.e., bony stenosis, disc herniation, ossification of the posterior longitudinal ligament [OPLL]) and pseudoarthrosis (NASS, 2014).

Cervical fusion is not indicated for discogenic axial neck pain in the absence of radiographic evidence of nerve root or spinal cord compression, instability, or spinal deformity or when cervical radiculopathy from isolated foraminal stenosis is treated with partial medial facetectomy or foraminotomy (NASS, 2014).

**Cervical Spinal Instability:** As noted above, cervical spinal instability has been defined as destruction of either the anterior or posterior elements of the spine making them nonfunctional, more than 3.5 mm of displacement of one vertebra in relation to another and/or greater than 11 degrees of rotational difference between adjacent vertebrae (White, Punjabi, 1980). Various conditions result in spinal instability, such as fractures, infection, tumors, inflammation, or other types of traumatic injury. Iatrogenic spinal instability is the result of direct surgical or medical intervention. For example, when multiple foraminotomies are performed or there is greater than 50% removal of the facet joint spinal instability may result (McAllister, et al., 2012, Komotar, et al, 2006). Treatment is aimed at re-stabilizing the spine and is based on the individual's symptoms, extent of deformity, functional impairment, disability, and response to conservative care.

**Cervical Radiculopathy from Degenerative Disorders:** Cervical radiculopathy is a condition affecting the nerve root in the cervical spinal column, which can result from either compressive (e.g., disc herniation, osteophytes, spondylosis) or non-compressive forces (e.g., infection, tumor infiltration). It is a common cause of acute and chronic neck pain often accompanied by weakness and sensory disturbance in the dermatomal distribution. Imaging studies (e.g., Computed Tomography [CT], magnetic resonance imaging [MRI], X-ray, CT myelography) along with electrodiagnostic testing, history and physical (e.g., provocative shoulder abduction tests, Spurling's test) are used to diagnose the condition. The most commonly affected nerve roots are C7, C6, and C8 (Iyer, et al 2016) resulting in pain in one or both upper extremities. The indications for surgery in patients with cervical radiculopathy are unremitting radicular pain despite six to eight weeks of conservative treatment, progressive motor weakness, or the presence of myelopathy.

**Clinical Myelopathy (Cervical Spinal Stenosis, Disc Herniation, OPLL):** Cervical spinal stenosis is a condition where the spinal canal narrows and results in compression on the spinal cord. The condition is often the result of aging. Degeneration of the discs may lead to development of bone spurs which can also cause pressure on the nerve roots. Diagnosis is made based on history, physical examination and radiographic imaging (computerized tomography [CT], magnetic resonance imaging [MRI], X-ray). Spinal instability associated with stenosis may arise intraoperatively (iatrogenic); cases of severe stenosis require more extensive decompression (i.e., complete facetectomy or resection of pars interarticularis creating a pars defect), which may destabilize the spine, destabilization may be treated with a cervical fusion procedure.

Cervical spondylotic myelopathy is a condition in which the spinal cord becomes compressed due to degenerative changes (e.g., arthritis, spondylosis) as a result of aging. Common causes include degenerating discs, rheumatoid arthritis and injury. Associated symptoms include numbness and tingling in the fingers, hands or arms; muscle weakness, loss of motor skills, and neck pain. The goal of surgical treatment is to relieve pressure on the spinal cord.

Herniation of a cervical disc, also referred to as a ruptured disc or slipped disc, is a common cause of neck pain. With this condition the center nucleus pushes through the outer edge of the disc and places pressure on the spinal nerves resulting in neck pain. Symptoms include dull or sharp neck pain, pain between the shoulder area, pain radiating along the nerve pathway down the arms to the hand and/or fingers, muscle weakness, and numbness or tingling. Diagnosis is confirmed by CT scan, MRI, and electrodiagnostic studies. Conservative treatment includes analgesics, nonsteroidal anti-inflammatory drugs (NSAIDs), physical therapy, exercise, bracing, injections and manipulation. In addition to artificial cervical disc replacement, posterior cervical discectomy may be performed however it is associated with more manipulation of the spinal cord and surrounding vasculature. Anterior cervical discectomy and fusion (ACDF) is most often the procedure of choice and is indicated when conservative measures fail to improve pain and disability.

**Cervical Pseudoarthrosis:** Pseudoarthrosis is failure of osseous bridging within the fusion mass. It is generally confirmed by radiograph or CT scan at least one year after the fusion. Nonunion rates following ACDF vary depending on the type of bone graft used, the surgical technique and the number of levels fused (McAnany, et al., 2015). It has been reported that one factor associated with increased risk of pseudoarthrosis is smoking (Brown, et al., 1986). Symptoms associated with cervical pseudoarthrosis include persistent or recurrent axial

neck pain, radiculopathy and myelopathy. Treatment of the pseudoarthrosis can be accomplished by performing a revision anterior procedure or by using a posterior approach. A revision anterior procedure requires dissection through scar tissue and may be associated with higher incidence of dysphagia and recurrent laryngeal nerve injury, although posterior approaches are associated with a higher overall complication rate (McAnany, et al., 2015). Higher fusion rates have been reported with posterior approaches (Kaiser, et. al., 2009).

### **Cervical Decompression Procedures**

Cervical vertebral corpectomy, is a procedure in which the body of the vertebrae is removed, partially or completely, as a method of decompressing the spinal cord. According to the American Association of Neurological Surgeons (AANS), the amount of bone removed is generally at least one-half of the vertebral body, and is significantly greater than the removal of cortical endplates for an interbody fusion. The procedure is performed from the front of the neck requiring an anterior approach. After removal of the vertebral bone the spine is reconstructed with bone graft materials and titanium spacers. Using instrumentation such as plates and screws the construct is then secured in place.

Cervical laminectomy is a procedure performed on the neck that involves removal of the lamina to decompress the spinal cord improving cervical spinal cord perfusion. Indications include cervical stenosis, cervical spondylotic myelopathy, spondylotic radiculopathy, ossification of the posterior longitudinal ligament (OPLL), ossification of the yellow ligament (OYL) neoplasm, and infection (McAllister, et al., 2012). In some clinical situations postlaminectomy deformity and disability may result due to the removal of posterior elements which disrupt the normal biomechanics of the cervical spine.

Posterior cervical laminoplasty is a procedure performed on the posterior neck area for treatment of spinal cord compression. During laminoplasty the laminar arch is reconstructed to increase space for the spinal cord. This procedure may be considered an alternative to posterior cervical fusion and involves the use of titanium plates for stabilization. It is commonly performed as treatment of ossification of the posterior longitudinal ligament (OPLL), spondylotic myelopathy, congenital spinal stenosis with posterior compression, syringomyelia, and when access to the spinal cord is required for tumor, vascular or other malformation.

### **Surgical Approaches**

The surgical approach to the cervical spine is determined by the site of the primary pathology and presence of instability. The cervical spine can be approached anteriorly, posteriorly, or as a combined approach. An anterior approach, performed from the front of the neck area is most often indicated for decompression of the spinal cord and usually requires fusion for stabilization. A posterior approach is performed from the back of the cervical spine area and has the advantage of avoiding potential soft-tissue complications seen with the anterior approach, such as damage to the vasculature or recurrent laryngeal nerve. A posterior approach may be used alone or in combination with an anterior approach.

Anterior approaches are generally recommended for decompression limited to one or two levels, fixed kyphotic deformity, and absence of significant narrowing of the canal. Posterior approaches are reserved for compression involving more than two levels, compression of the canal, lordotic alignment and primary posterior compressive pathology (Komotar, et al., 2006).

Evidence in the peer-reviewed literature supports that for treatment of cervical spondylotic myelopathy, anterior and posterior approaches have equivalent efficacy (Fehlings, et al., 2013). In the presence of instability, (e.g., subluxation of greater than 3.5 mm, greater than 11 degrees of angulation between adjacent segments, or more than 4mm of subluxation on dynamic views), a posterior decompression without stabilization (fusion) is likely to result in a progressive deformity (Komotar, et al., 2006).

### **Cervical Facet Joint Fusion**

Cervical facet joint fusion is a procedure that involves placement of bone dowels made from graft material (e.g., autograft, allograft or prepared [e.g., TruFuse®]) into the facet joints to provide stabilization to the spine (i.e., prevent movement) thereby reducing pain. Facet joints are the articulations or connections between the vertebrae. Pain in the facet joint can result from trauma, degenerative changes causing instability of the spine, or it can result from age-related deterioration. Treatment is aimed at reducing pain and includes rest, physical therapy, nonsteroidal anti-inflammatory medications, and facet joint injections. When conservative treatment

fails to relieve symptoms and the intervertebral disc is damaged discectomy and posterior fusion may be performed to relieve pressure on the nerve. Fusing the facet joint has been proposed as an alternative to spinal fusion, however evidence in the peer-reviewed published scientific literature evaluating cervical facet joint fusion is limited to small, uncontrolled trials, mainly retrospective, with short to mid term followup. Long term clinical outcomes are lacking. The published evidence is insufficient to support clinical efficacy.

### **Professional Societies/Organizations**

**North American Spine Society (NASS):** According to the NASS evidence-based clinical guidelines “Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders” (Bono, et al., 2010), the evidence evaluating the outcomes of posterior decompression with fusion compared to posterior decompression alone for treatment of radiculopathy resulting from degenerative disorders is lacking. Most decompression and fusion procedures appear to be indicated for multilevel stenosis resulting in myelopathy or for instability due to trauma, tumor, or inflammatory disease. The authors noted however future study of posterior decompression with fusion is not recommended. According to the authors the procedure is only occasionally indicated, data would not be sufficient, and clinical outcomes could not be studied effectively. NASS further notes both ACD and ACDF are considered comparable treatments with similar clinical outcomes and that ACDF and ACD with total disc replacement are comparable with similar outcomes. When evaluating long term results of single-level compared with multilevel surgical decompression for radiculopathy due to the degenerative disorders data was insufficient and a recommendation was not made. In addition NASS recommends the following:

- Individuals undergo MRI or CT scans only when conservative measures have failed and surgical treatment is being considered (Grade B recommendation, Work Group Consensus)
- Surgical intervention is suggested for rapid relief of symptoms of cervical radiculopathy from degenerative disorders when compared to medical/interventional treatment (Grade B recommendation)
- Emotional and cognitive factors should be considered as part of medical/interventional treatment (Grade I recommendation)
- Either ACDF or PLF are suggested for the treatment of single level degenerative cervical radiculopathy secondary to foraminal soft disc herniation to achieve comparably successful clinical outcomes (Grade B recommendation)
- Surgery is an option for the treatment of single level degenerative radiculopathy to produce and maintain favorable long term (greater than four year) outcomes (Grade C recommendation)

**The American College of Occupational and Environmental Medicine (ACOEM):** ACOEM published clinical guidelines for cervical and thoracic disorders (ACOEM, 2011). Within these guidelines summary of recommendations for managing cervicothoracic disorders, the authors note for radicular pain resulting from nerve compression cervical discectomy and fusion is indicated for individuals who continue to have significant pain and functional limitation despite six weeks of appropriate nonoperative therapy (based on consensus). Decompressive surgery (laminoplasty, laminectomy, discectomy with fusion) is indicated for treatment of myelopathy (based on consensus). Decompression with fusion is indicated for patients with symptomatic spinal stenosis intractable to nonoperative management (based on consensus) and fusion is indicated for degenerative spondylolisthesis (based on limited evidence).

**U.S. Food and Drug Administration (FDA):** Cervical fusion is a surgical procedure and is therefore not regulated by the U.S. Food and Drug Administration. However, associated instrumentation, stabilization and decompression devices used as part of the cervical fusion procedure do require approval by the FDA.

### **Literature Review**

Evidence in the peer-reviewed, published scientific literature, including professional society recommendations support cervical fusion is effective for treatment of cervical spine instability and other conditions. In addition, textbook sources support cervical fusion as a well-established procedure effective for treatment of herniated disc with spinal cord compression (Camillo, 2017) cervical spine injury, including fracture and trauma (Williams, 2017), and instability resulting either from trauma or degenerative processes such as autoimmune, inflammatory, infections, neoplastic, or that are congenital in origin (Levelen, et al 2018). Similar to lumbar fusion, physician supervised medical management should be part of a comprehensive multidisciplinary pain management program in non-emergent situations. In addition, physical examination and imaging studies should correlate with neural compression at the appropriate level.



**The American Board of Internal Medicine’s (ABIM) Foundation Choosing Wisely® Initiative:** As part of the Choosing Wisely initiative NASS released a list of common spine tests and treatments physicians and patients should question (NASS, 2013). Two of the five are related to spinal fusion surgery as follows:

- Bone morphogenetic protein is a compound which stimulates bone formation and healing and should not be used for routine anterior cervical spine fusion surgery. Life-threatening complications have been reported in the routine use of recombinant human rhBMP in anterior cervical spine fusion surgery, due to swelling of the soft tissues. This may lead to difficulty swallowing or pressure on the airway.
- Electromyography and nerve conduction studies are measures of nerve and muscle function. They may be indicated when there is concern for a neurologic injury or disorder, such as the presence of leg or arm pain, numbness or weakness associated with compression of a spinal nerve. As spinal nerve injury is not a cause of neck, mid back or low back pain, EMG/NCS have not been found to be helpful in diagnosing the underlying causes of axial lumbar, thoracic and cervical spine pain.

**Centers for Medicare & Medicaid Services (CMS)**

- National Coverage Determinations (NCDs): No NCDs found.
- Local Coverage Determinations (LCDs): No LCDs found.

**Use Outside of the US:** No relevant information found.

**Coding/Billing Information**

**Note:** 1) This list of codes may not be all-inclusive.  
 2) Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

**Considered Medically Necessary when criteria in the applicable policy statements listed above are met:**

**Cervical Fusion: Anterior**

CPT®* Codes	Description
22548	Arthrodesis, anterior transoral or extraoral technique, clivus-C1-C2 (atlas-axis), with or without excision of odontoid process
22551	Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophyctomy and decompression of spinal cord and/or nerve roots; cervical below C2
22552	Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophyctomy and decompression of spinal cord and/or nerve roots; cervical below C2, each additional interspace (List separately in addition to code for separate procedure)
22554	Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); cervical below C2
22585	Arthrodesis, anterior interbody technique, including minimal discectomy to prepare interspace (other than for decompression); each additional interspace (List separately in addition to code for primary procedure)
22808	Arthrodesis, anterior, for spinal deformity, with or without cast; 2 to 3 vertebral segments
22810	Arthrodesis, anterior, for spinal deformity, with or without cast; 4 to 7 vertebral segments
22812	Arthrodesis, anterior, for spinal deformity, with or without cast; 8 or more vertebral segments

**Cervical Fusion: Posterior**

CPT®* Codes	Description
22590	Arthrodesis, posterior technique, craniocervical (occiput-C2)
22595	Arthrodesis, posterior technique, atlas-axis (C1-C2)
22600	Arthrodesis, posterior or posterolateral technique, single level; cervical below C2 segment
22614	Arthrodesis, posterior or posterolateral technique, single level; each additional vertebral segment (List separately in addition to code for primary procedure)

22800	Arthrodesis, posterior, for spinal deformity, with or without cast; up to 6 vertebral segments
22802	Arthrodesis, posterior, for spinal deformity, with or without cast; 7 to 12 vertebral segments

**Considered Experimental, Investigational or Unproven when used to report isolated cervical facet fusion, including facet joint implants and/or bone graft substitutes used exclusively as stand-alone stabilization devices for treatment of facet joint pain:**

<b>CPT®* Codes</b>	<b>Description</b>
22899	Unlisted procedure, spine
0219T	Placement of a posterior intrafacet implant(s), unilateral or bilateral, including imaging and placement of bone graft(s) or synthetic device(s), single level; cervical
0222T	Placement of a posterior intrafacet implant(s), unilateral or bilateral, including imaging and placement of bone graft(s) or synthetic device(s), single level; each additional vertebral segment (List separately in addition to code for primary procedure)

### **Other Procedures That May Be Related to Cervical Fusion**

**Requires Clinical Review to determine Medical Necessity:**

<b>CPT®* Codes</b>	<b>Description</b>
22210	Osteotomy of spine, posterior or posterolateral approach, 1 vertebral segment; cervical
22216	Osteotomy of spine, posterior or posterolateral approach, 1 vertebral segment; each additional vertebral segment (List separately in addition to primary procedure)
22220	Osteotomy of spine, including discectomy, anterior approach, single vertebral segment; cervical
22226	Osteotomy of spine, including discectomy, anterior approach, single vertebral segment; each additional vertebral segment (List separately in addition to code for primary procedure)
22326	Open treatment and/or reduction of vertebral fracture(s) and/or dislocation(s), posterior approach, 1 fractured vertebra or dislocated segment; cervical
22328	Open treatment and/or reduction of vertebral fracture(s) and/or dislocation(s), posterior approach, 1 fractured vertebra or dislocated segment; each additional fractured vertebra or dislocated segment (List separately in addition to code for primary procedure)
22840	Posterior non-segmental instrumentation (eg, Harrington rod technique, pedicle fixation across 1 interspace, atlantoaxial transarticular screw fixation, sublaminar wiring at C1, facet screw fixation) (List separately in addition to code for primary procedure)
22841	Internal spinal fixation by wiring the spinous processes (List separately in addition to code for primary procedure)
22842	Posterior segmental instrumentation (eg, pedicle fixation, dual rods with multiple hooks and sublaminar wires); 3 to 6 vertebral segments (List separately in addition to code for primary procedure)
22843	Posterior segmental instrumentation (eg, pedicle fixation, dual rods with multiple hooks and sublaminar wires); 7 to 12 vertebral segments (List separately in addition to code for primary procedure)
22844	Posterior segmental instrumentation (eg, pedicle fixation, dual rods with multiple hooks and sublaminar wires); 13 or more vertebral segments (List separately in addition to code for primary procedure)
22845	Anterior instrumentation; 2 to 3 vertebral segments (List separately in addition to code for primary procedure)
22846	Anterior instrumentation; 4 to 7 vertebral segments (List separately in addition to code for primary procedure)

22847	Anterior instrumentation; 8 or more vertebral segments (List separately in addition to code for primary procedure)
22848	Pelvic fixation (attachment of caudal end of instrumentation to pelvic bony structures) other than sacrum (List separately in addition to code for primary procedure)
22849	Reinsertion of fixation device
22850	Removal of posterior nonsegmental instrumentation (eg Harrington rod)
22852	Removal of posterior segmental instrumentation
22853	Insertion of interbody biomechanical device(s) (eg, synthetic cage, mesh) with integral anterior instrumentation for device anchoring (eg, screws, flanges), when performed, to intervertebral disc space in conjunction with interbody arthrodesis, each interspace (List separately in addition to code for primary procedure)
22854	Insertion of intervertebral biomechanical device(s) (eg, synthetic cage, mesh) with integral anterior instrumentation for device anchoring (eg, screws, flanges), when performed, to vertebral corpectomy(ies) (vertebral body resection, partial or complete) defect, in conjunction with interbody arthrodesis, each contiguous defect (List separately in addition to code for primary procedure)
22855	Removal of anterior instrumentation
22859	Insertion of intervertebral biomechanical device(s) (eg, synthetic cage, mesh, methylmethacrylate) to intervertebral disc space or vertebral body defect without interbody arthrodesis, each contiguous defect (List separately in addition to code for primary procedure)

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