Cohere Medical Policy - Pediatric Vertebral Body Tethering (VBT) and Vertical Expandable Prosthetic Titanium Rib (VEPTR)

Clinical Policy for Medical Necessity Review

Version: 2
Cohere Health UMC Approval Date: August 14, 2025
Last Annual Review: August 14, 2025
Revision: Not Applicable
Next Annual Review: August 14, 2026

Important Notices

Notices & Disclaimers:

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Policy Information:

Specialty Area: Musculoskeletal Care
Policy Name: Cohere Medical Policy - Pediatric Vertebral Body Tethering
Type: [_] Adult (18+ yo) | [**X**] Pediatric (0-17 yo)

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Medical Necessity Criteria

Service: Pediatric Vertebral Body Tethering (VBT) and Vertical Expandable Prosthetic Titanium Rib (VEPTR)

Cohere Health takes an evidence-based approach to reviewing imaging and procedure requests, meaning that sufficient clinical information must be provided at the time of submission to determine medical necessity. Documentation must include a recent and detailed history, physical examination related to the onset or change in symptoms, relevant lab results, prior imaging, and details of previous treatments. Advanced imaging or procedures should be requested after a clinical evaluation by the treating provider, which may include referral to a specialist.

- When a specific clinical indication is not explicitly addressed in the Cohere Health medical policy, medical necessity will be determined based on established clinical best practices, as supported by evidence-based literature, peer-reviewed sources, professional society guidelines, and state or national recommendations, unless otherwise directed by the health plan.
- Requests submitted without clinical documentation, or those that do not align with the provided clinical information—such as mismatched procedure, laterality, body part, or CPT code—may be denied for lack of medical necessity due to insufficient or inconsistent clinical information.
- When there are multiple diagnostic or therapeutic procedures requested simultaneously or within the past three months, each will be reviewed independently. Clinical documentation must clearly justify all of the following:
  - The medical necessity of each individual request
  - Why prior imaging or procedures were inconclusive, or why additional/follow-up studies are needed
  - How the results will impact patient management or treatment decisions
- Requests involving adjacent or contiguous body parts may be considered not medically necessary if the documentation demonstrates that the

patient's primary symptoms can be adequately assessed with a single study or procedure.

Description

Vertebral body tethering (VBT) uses hardware such as screws and cords that are implanted near the curved area of a spine with scoliosis. The procedure requires only small incisions and devices.[1-5] The Pediatric Orthopaedic Society of North America (POSNA) notes that most patients are treated with VBT under the United States Food and Drug Administration (FDA) Humanitarian Device Exemption (HDE) program, which allows off-label use for anterior VBT.[4] The vertical expandable prosthetic titanium rib (VEPTR) is an FDA-approved device that allows the ribcage to expand to straighten the spine and support normal respiration or lung growth. The curved metal rod is attached to the ribs, spine, or pelvis and is expandable to accommodate growth.

Medical Necessity Criteria

Indications

Pediatric vertebral body tethering (VBT) and vertical expandable prosthetic titanium rib (VEPTR) are considered appropriate if **ANY** of the following is **TRUE**:

- Vertebral body tethering (VBT) is considered appropriate with **ALL** of the following:
  - Failure of conservative management for greater than 3 months, including **ALL** of the following[6]:
    - Physical therapy or a physician-directed home exercise program; **AND**
    - Bracing[7]; **AND**
  - Spinal curve flexibility greater than 30%; **AND**
  - Radiographs demonstrating a Cobb angle of 40 to 60 degrees[1,4]; **AND**
  - Skeletal immaturity with **ANY** of the following:
    - Risser grade 0 or 1; **OR**
    - Sanders Maturity Scale less than or equal to 4; **AND**
  - The procedure is performed at a Center of Excellence (COE) specialized in anterior spinal surgery[8]; **OR**

- Vertical expandable prosthetic titanium rib (VEPTR) is considered appropriate with **ALL** of the following:
  - Failure of conservative management for greater than 3 months, including **ALL** of the following[6]:
    - Anti-inflammatory medications, non-opioid analgesics, or prescription medications (e.g., oral steroids, neuropathic pain medications) if not contraindicated; **AND**
    - Physical therapy, including a physician-directed home exercise program; **AND**
    - **ANY** of the following:
      - Corticosteroid injection if medically appropriate[9]; **OR**
      - Documentation that corticosteroid injection is contraindicated; **AND**
  - The patient has **ANY** of the following:
    - Progressive thoracic insufficiency syndrome[10,11]; **OR**
    - Scoliosis (e.g., congenital, neuromuscular, idiopathic, syndromic)[10,11]; **OR**
    - Complex spinal deformities; **OR**
    - Chest wall defects; **AND**
  - The patient is skeletally immature, between 6 months of age and skeletal maturity, with **ANY** of the following[10,11]:
    - Risser grade 0 or 1[12]; **OR**
    - Sanders Maturity Scale less than or equal to 4[13]; **AND**
  - The procedure is performed at a Center of Excellence (COE) specialized in anterior spinal surgery[8]; **AND**
  - Preoperative evaluation has been done with the evaluation of **ALL** of the following:
    - Appropriate nutrition status as indicated by **ANY** of the following[14]:
      - Albumin less than 3.5 g/dL; **OR**
      - Total lymphocyte count less than 1,500 cells/mm3; **OR**
      - Transferrin level less than 200 mg/dL; **AND**
    - Cardiac status; **AND**
    - Pulmonary function.

Non-Indications

Pediatric vertebral body tethering (VBT) and vertical expandable prosthetic titanium rib (VEPTR) are not considered appropriate if **ANY** of the following is **TRUE**:

- **ANY** of the following for VBT:
  - The patient is skeletally mature[4]; **OR**
  - The patient is non-ambulatory[4]; **OR**
  - Growing rods are being used (FDA device recall); **OR**
  - Active or chronic infection (e.g., systemic, local)[2,5,10,11]; **OR**
  - Known allergy to titanium alloys or magnetic resonance contrast agents[2,5,10,11]; **OR**
  - The patient has **ANY** of the following conditions:
    - Axial back pain only, with no leg, buttock, or groin pain[2,5]; **OR**
    - Back or leg pain, unknown etiology[2,5]; **OR**
    - Morbid obesity body mass index (BMI) greater than 40)[2,5]; **OR**
    - Vertebral malformations[4]; **OR**
    - Chest malformations[4]; **OR**
    - Altered muscle function or control[4]; **OR**
    - Severe facet hypertrophy that requires extensive bone removal, which would cause instability[2,5]; **OR**
    - Grade II or greater spondylolisthesis[2,5]; **OR**
    - Isthmic spondylolisthesis or spondylolysis (pars fracture)[2,5]; **OR**
    - Degenerative lumbar scoliosis (Cobb angle greater than 25° lumbar segmental)[2,5]; **OR**
    - Osteopenia[2,5]; **OR**
    - Osteoporosis[2,5]; **OR**
    - Metabolic bone disease (e.g., Paget disease, osteomalacia)[5]; **OR**
    - Rheumatoid arthritis or an autoimmune disease that requires chronic steroid use[5]; **OR**
    - Cauda equina syndrome[2,5]; **OR**
    - Active malignancy of an invasive malignancy (excluding nonmelanoma skin cancer, primary bony tumor), unless the patient has had no clinical signs or symptoms of the malignancy for at least 5 years with treatment that has curative intent[5]; **OR**
  - More than 2 vertebral levels require surgical decompression[5]; **OR**
  - Previous surgical procedure resulted in gross translatory instability of the lumbar spine[5]; **OR**

    - Previous fusion of **ANY** of the following[2,5]:
        - Implantation of a total disc replacement; **OR**
        - Complete laminectomy at index level; **OR**
    - Radiographically compromised vertebral bodies at any lumbar level(s) caused by current or past trauma, tumor, or infection[2,5]; **OR**
    - Radiographs demonstrate gross angular or translatory instability of the spine at index or adjacent levels with sagittal plane translation greater than 4.0 mm as spondylolisthesis or retrolithesis[5]; **OR**
- **ANY** of the following for VEPTR[10,11]:
    - Bone strength of the ribs or the spine cannot support where the VEPTR would be attached; **OR**
    - Missing ribs nearest and furthest away from where the VEPTR device needs to be placed and attached; **OR**
    - The diaphragm cannot work properly; **OR**
    - Lack of soft tissue for coverage of VEPTR; **OR**
    - Active or chronic infection (e.g., systemic, local); **OR**
    - Known allergy to titanium alloys or magnetic resonance contrast agents; **OR**
    - The patient is skeletally mature (about age 14 for girls and age 16 for boys) with problems other than chest wall instability; **OR**
    - The patient is younger than 6 months of age.

Definitions

Center of Excellence (COE): A facility specialized to provide an "exceptionally high concentration of expertise and related resources centered on particular medical areas and delivered in a comprehensive, interdisciplinary fashion."[8]

Moderate stenosis: A reduction of more than 25% of the anteroposterior dimension versus the next normal, adjacent level. This includes a comparison of nerve root crowding and a patient's normal level as demonstrated by imaging (e.g., CT, MRI).[5]

Instability: White and Panjabi's classification for stability specifies a "sagittal plane translation greater than 4.0 mm or 15% or local sagittal plane rotation greater than 15° at L1–2, L2–3, and L3–4; greater than 20° at L4–5 based on standing flexion-extension radiographs)."[5]

Skeletal maturity: The Scoliosis Research Society defines skeletally immature as patients "Risser 2 and under OR Sanders 5 and less, as under current understanding, growth modulation depends on meaningful remaining skeletal growth."[4]

Level of Care Criteria

Inpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
0656T	Anterior lumbar or thoracolumbar vertebral body tethering; up to 7 vertebral segments
0657T	Anterior lumbar or thoracolumbar vertebral body tethering; 8 or more vertebral segments
0790T	Revision (e.g., augmentation, division of tether), replacement, or removal of thoracolumbar or lumbar vertebral body tethering, including thoracoscopy, when performed
22836	Anterior thoracic vertebral body tethering, including thoracoscopy, when performed; up to 7 vertebral segments
22837	Anterior thoracic vertebral body tethering, including thoracoscopy, when performed; 8 or more vertebral segments
22838	Revision (e.g., augmentation, division of tether), replacement, or removal of thoracic vertebral body tethering, including thoracoscopy, when performed
22899	Unlisted procedure, spine

Medical Evidence

According to Trobisch et al. (2024), vertebral body tethering is being used as a motion-preserving technique. In a retrospective review of 25 patients, thoracic curve correction averaged 55.4% and 71.7% for TL/L curves. Some patients did have breakage of the tether, but none required a posterior spinal fusion.[15]

Roser et al. (2023) performed a systematic review and meta-analysis of 16 studies of cases that used a tethering system. Vertebral body tethering resulted in a statistically significant reduction in Cobb angle, with an average reduction of 25 degrees. The most common complication was tether breakage; however, the consequence of this complication is unknown.[16]

Baroncini et al. (2022) conducted a study of 105 patients to analyze risk factors of tether breakage following VBT. Most patients are asymptomatic following a breakage and do not require additional procedures. However, when breakage occurs within 1 year, the loss of correction is higher. The authors analyzed "the influence of patient demographic, pre- and postoperative radiographic parameters, and intraoperative correction technique on the risk of early tether breakage in patients who underwent VBT." A significant indicator is the presence of large, rigid curves on the spine; of the 58 curves that demonstrated breakage, 71% were lumbar, and 29% were thoracic. A total of 95 curves were observed that did not have breakage (71% thoracic, 29% lumbar). Overall, the patient's skeletal maturity and age did not demonstrate a correlation to breakage.[17]

Zhu et al. (2022) performed a systematic review and a single-arm meta-analysis of VBT to treat scoliosis. A total of 1045 patients from 26 studies were included. Overall, the authors note a 73.02% success rate; however, 15.8% of patients required additional surgery. Over half of the patients (52.17%) reported complications, including curve progression with tether breakage, pulmonary complications, and overcorrection.[18]

Shin et al. (2021) performed a meta-analysis that included 211 patients from 10 studies on the efficacy of anterior VBT vs posterior spinal fusion to treat adolescent idiopathic scoliosis. The authors compared complication and

reoperation rates. Patients demonstrated higher complication rates with anterior VBT. The authors note the need for long-term, randomized, prospective studies to analyze the efficacy of VBT for the adolescent population.[19]

Bednar et al. (2021) compared magnetically controlled growing rods with other distraction techniques through a systematic review and meta-analysis. A review of 18 studies showed that magnetically controlled growing rods were as clinically effective as other technologies. A lower complication rate was also noted, as well as greater serum titanium levels in patients with magnetically controlled growing rods, but the clinical impact is unclear.[20]

United States Food and Drug Administration (FDA)

In 2023, the United States Food & Drug Administration (FDA) (2023) approved the Tether Vertebral Body Tethering System for skeletally immature patients with progressive idiopathic scoliosis who have failed or not tolerated brace wear.[1] The FDA approved OrthoPediatrics (eLLi) Growing Rod System for scoliosis in 2024.

In 2019, the United States Food and Drug Administration (FDA) approved the first device for use in idiopathic adolescent scoliosis surgeries. The Tether™ – Vertebral Body Tethering System received Humanitarian Use Device (HUD) designation on March 28, 2019. The humanitarian device exemption (HDE) was approved on August 16, 2019, by the Center for Devices and Radiological Health (CDRH) of the Food and Drug Administration (H190005).[1-5]

The Indication for Use statement was modified to grant permission for the HUD designation. The HUD designation was for "use in the treatment of juvenile and adolescent idiopathic scoliosis in patients, age 5 to 19 years, who are skeletally immature and have a Risser Score of less than 5, that require surgical treatment or have failed non-surgical treatments to obtain and maintain correction of severe, progressive spinal deformities with a Cobb angle of greater than or equal to 30°." Modifications for approval included[1]:

- Removed age ranges.
- Removed "juvenile and adolescent," as chronological age and skeletal maturity vary among populations.

- Specified that the patient should have dimensionally adequate osseous structures representative of the age range and diagnosis.
- Removed reference to a specific skeletal maturity scoring system, as there are different existing methods, and the HUD analysis was not closely linked to a specific method.
- Identified a Cobb angle range to better reflect the study population.

In 2017, the FDA approved the MAGEC (MAGnetic Expansion Control) Spinal Bracing and Distraction System for treating children with early onset scoliosis (EOS). The MAGEC system is a non-invasive treatment that uses adjustable growing rods controlled by magnets and an external remote control to help straighten a child's spine. The rods are implanted during surgery and then lengthened every 3 to 6 months as the child grows, which usually requires another surgery. The goal is to control the spinal deformity until the child has enough spinal and thoracic development, at which point they can consider definitive spinal fusion.[21]

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Policy Revision History/Information

Original Date: August 8, 2024		
Review History		
Version 2	08/14/2025	Annual review. Updated title for clarity - from “Pediatric Vertebral Body Tethering” to “Pediatric Vertebral Body Tethering (VBT) and Vertical Expandable Prosthetic Titanium Rib (VEPTR)”. For VBT, added “bracing” to the indications for failure of conservative management. Removed indications for anti-inflammatory medications, non-opioid analgesics, prescription medications, and corticosteroids. For VBT and VEPTR, added the indication “the procedure is performed at a Center of Excellence (COE) specialized in anterior spinal surgery.” Added indication for VEPTR in cases of progressive thoracic insufficiency syndrome, scoliosis, complex spinal deformities, or chest wall defects. For VEPTR, revised the nutrition status under preoperative evaluation. Expanded non-indications section for both vertebral body tethering and vertical expandable prosthetic titanium ribs.

		Expanded the Medical Evidence section; added 3 citations.