MEDICAL POLICY

POLICY TITLE	**VERTICAL EXPANDABLE PROSTHETIC TITANIUM RIB**
POLICY NUMBER	**1.136**

CLINICAL BENEFIT	☐ MINIMIZE SAFETY RISK OR CONCERN. ☐ MINIMIZE HARMFUL OR INEFFECTIVE INTERVENTIONS. ☐ ASSURE APPROPRIATE LEVEL OF CARE. ☐ ASSURE APPROPRIATE DURATION OF SERVICE FOR INTERVENTIONS. ☒ ASSURE THAT RECOMMENDED MEDICAL PREREQUISITES HAVE BEEN MET. ☐ ASSURE APPROPRIATE SITE OF TREATMENT OR SERVICE.
Effective date:	**8/1/2026**

POLICY

Use of the vertical expandable prosthetic titanium rib is considered **medically necessary** in the treatment of progressive thoracic insufficiency syndrome due to rib and/or chest wall defects in infants/children between 6 months of age and skeletal maturity.

Use of the vertical expandable prosthetic titanium rib for all other conditions, including but not limited to the treatment of scoliosis in individuals without thoracic insufficiency, is considered **investigational** as there is insufficient evidence to support a general conclusion concerning the health outcomes or benefits associated with this procedure.

POLICY GUIDELINES

Due to complexity of thoracoplasty and the young age of the individuals undergoing such a procedure, implantation of the vertical expandable prosthetic titanium rib should be performed in specialized centers. Preoperative evaluation should require input from a pediatric orthopedist, a pulmonologist, and a thoracic surgeon. In addition, preoperative evaluation should require (when possible) a test for positive nutritional, cardiac, and pulmonary function.

PRODUCT VARIATIONS

This policy is only applicable to certain programs and products administered by Capital Blue Cross and subject to benefit variations. Please see additional information below.

FEP PPO: Refer to FEP Medical Policy Manual. The FEP Medical Policy manual can be found at: https://www.fepblue.org/benefit-plans/medical-policies-and-utilization-management-guidelines/medical-policies

DESCRIPTION/BACKGROUND

Vertical Expandable Prosthetic Titanium Rib

While spinal fusion is an approach to treatment in individuals with thoracic insufficiency syndrome, or early-onset scoliosis without thoracic insufficiency syndrome, the procedure may not be successful and may limit growth (lengthening) of the spine.

The vertical expandable prosthetic titanium rib device is a curved rod placed vertically in the chest that helps to stabilize and shape the thoracic cavity. It is positioned either between ribs, or

between the ribs and either the spine or pelvis. The vertical expandable prosthetic titanium rib may be described as “rib-based” growth-sparing instrumentation, which is compared with “spine-based” growing rods for Cobb angle correction. The vertical expandable prosthetic titanium rib device is designed to be expanded every 4 to 6 months as growth occurs and to be replaced if necessary. Some patients require multiple devices.

Regulatory Status

The VEPTR™ (DePuy Synthes Spine, Raynham, MA) was initially cleared (in 2004) for marketing by the U.S. Food and Drug Administration (FDA) through a humanitarian device exemption for the treatment of thoracic insufficiency syndrome in skeletally immature patients. In 2014, the VEPTR/VEPTR II™ was cleared for marketing by the FDA through the 510(k) process. The VEPTR/VEPTR II device is indicated for skeletally immature patients with severe, progressive spinal deformities and/or 3-dimensional deformity of the thorax associated with or at risk of thoracic insufficiency syndrome. This would include patients with progressive congenital, neuromuscular, idiopathic, or syndromic scoliosis.

To identify potential individuals with thoracic insufficiency syndrome, the following categories are used:

- Flail chest syndrome;
- Rib fusion and scoliosis; and
- Hypoplastic thorax syndrome, including:
    - Jeune syndrome,
    - Achondroplasia,
    - Jarcho-Levin syndrome, and
    - Ellis-van Creveld syndrome.

In 2024, the RESPONSE™ Rib and Pelvic System (OrthoPediatrics, Warsaw, Indiana) was deemed substantially equivalent to the VEPTR device by the FDA (K233105).

FDA product code: MDI.

RATIONALE

SUMMARY OF EVIDENCE

For individuals who have progressive thoracic insufficiency syndrome due to rib and/or chest wall defects in childhood who receive vertical expandable prosthetic titanium rib thoracoplasty, the evidence includes case series. Relevant outcomes are symptoms, morbid events, functional outcomes, and treatment-related mortality and morbidity. Results from case series reported at different specialty centers have demonstrated improvement and/or stabilization in key measures with use of the vertical expandable prosthetic titanium rib in progressive thoracic insufficiency syndrome. This improvement has been noted in measures related to thoracic structure (e.g., Cobb angle for those with scoliosis), growth of the thoracic spine and lung volumes, and stable or improved ventilatory status. While pulmonary function testing is difficult to track in patients suffering with thoracic insufficiency syndrome, a study has demonstrated an age-specific increase in forced vital capacity; further still, that same study reported a final forced vital capacity in the range of 50% to 70% of predicted value. Given the usual disease course of

worsening thoracic volume and ventilatory status, the stabilization and/or improvement in the clinical measures outlined above would be highly unlikely if not for the intervention. Taken together, these outcomes demonstrate the positive impact of using the vertical expandable prosthetic titanium rib technology. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with early-onset scoliosis without thoracic insufficiency syndrome who receive vertical expandable prosthetic titanium rib thoracoplasty, the evidence includes a non-randomized controlled studies, an uncontrolled cohort study, and a case studies. Relevant outcomes are symptoms, morbid events, functional outcomes, and treatment-related mortality and morbidity. The vertical expandable prosthetic titanium rib is being evaluated for curves greater than 45° in infants and juveniles without thoracic insufficiency. Similar to thoracic insufficiency syndrome, very limited data are available on the use of the vertical expandable prosthetic titanium rib for early-onset scoliosis without thoracic insufficiency. Additionally, little is known about the disease progression of early-onset scoliosis, and therefore little is known regarding the risk-benefit trade-off of the vertical expandable prosthetic titanium rib surgery. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

DEFINITIONS

NA

DISCLAIMER

Capital Blue Cross' medical policies are used to determine coverage for specific medical technologies, procedures, equipment, and services. These medical policies do not constitute medical advice and are subject to change as permitted by law or applicable clinical evidence from independent treatment guidelines. Treating providers are solely responsible for medical advice and treatment of members. These polices are not a guarantee of coverage or payment. Payment of claims is subject to a determination regarding the member's benefit program and eligibility on the date of service, and a determination that the services are medically necessary and appropriate. Final processing of a claim is based upon the terms of contract that applies to the members' benefit program, including benefit limitations and exclusions. If a provider or a member has a question concerning this medical policy, please contact Capital Blue Cross' Provider Services or Member Services.

CODING INFORMATION

Note: This list of codes may not be all-inclusive, and codes are subject to change at any time. The identification of a code in this section does not denote coverage as coverage is determined by the terms of member benefit information. In addition, not all covered services are eligible for separate reimbursement.

Covered when medically necessary:

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Procedure Codes								
20999	21899	22899						

ICD-10-CM Diagnosis Codes	Description
J80	Acute respiratory distress syndrome
M41.00	Infantile idiopathic scoliosis, site unspecified
M41.02	Infantile idiopathic scoliosis, cervical region
M41.03	Infantile idiopathic scoliosis, cervicothoracic region
M41.04	Infantile idiopathic scoliosis, thoracic region
M41.05	Infantile idiopathic scoliosis, thoracolumbar region
M41.06	Infantile idiopathic scoliosis, lumbar region
M41.07	Infantile idiopathic scoliosis, lumbosacral region
M41.08	Infantile idiopathic scoliosis, sacral and sacrococcygeal region
M41.11	Juvenile idiopathic scoliosis, cervical region
M41.112	Juvenile idiopathic scoliosis, cervicothoracic region
M41.113	Juvenile idiopathic scoliosis, cervicothoracic region
M41.114	Juvenile idiopathic scoliosis, thoracic region
M41.115	Juvenile idiopathic scoliosis, thoracolumbar region
M41.116	Juvenile idiopathic scoliosis, lumbar region
M41.117	Juvenile idiopathic scoliosis, lumbosacral region
M41.119	Juvenile idiopathic scoliosis, site unspecified
M41.122	Adolescent idiopathic scoliosis, cervical region
M41.123	Adolescent idiopathic scoliosis, cervicothoracic region
M41.124	Adolescent idiopathic scoliosis, thoracic region
M41.125	Adolescent idiopathic scoliosis, thoracolumbar region
M41.126	Adolescent idiopathic scoliosis, lumbar region
M41.127	Adolescent idiopathic scoliosis, lumbosacral region
M41.129	Adolescent idiopathic scoliosis, site unspecified
M41.20	Other idiopathic scoliosis, site unspecified
M41.22	Other idiopathic scoliosis, cervical region
M41.23	Other idiopathic scoliosis, cervicothoracic region
M41.24	Other idiopathic scoliosis, thoracic region
M41.25	Other idiopathic scoliosis, thoracolumbar region
M41.26	Other idiopathic scoliosis, lumbar region
M41.27	Other idiopathic scoliosis, lumbosacral region
M41.30	Thoracogenic scoliosis, site unspecified
M41.34	Thoracogenic scoliosis, thoracic region

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ICD-10-CM Diagnosis Codes	Description
M41.35	Thoracogenic scoliosis, thoracolumbar region
M41.40	Neuromuscular scoliosis, site unspecified
M41.41	Neuromuscular scoliosis, occipito-atlanto-axial region
M41.42	Neuromuscular scoliosis, cervical region
M41.43	Neuromuscular scoliosis, cervicothoracic region
M41.44	Neuromuscular scoliosis, thoracic region
M41.45	Neuromuscular scoliosis, thoracolumbar region
M41.46	Neuromuscular scoliosis, lumbar region
M41.47	Neuromuscular scoliosis, lumbosacral region
M41.50	Other secondary scoliosis, site unspecified
M41.52	Other secondary scoliosis, cervical region
M41.53	Other secondary scoliosis, cervicothoracic region
M41.54	Other secondary scoliosis, thoracic region
M41.55	Other secondary scoliosis, thoracolumbar region
M41.56	Other secondary scoliosis, lumbar region
M41.57	Other secondary scoliosis, lumbosacral region
M41.80	Other forms of scoliosis, site unspecified
M41.82	Other forms of scoliosis, cervical region
M41.83	Other forms of scoliosis, cervicothoracic region
M41.84	Other forms of scoliosis, thoracic region
M41.85	Other forms of scoliosis, thoracolumbar region
M41.86	Other forms of scoliosis, lumbar region
M41.87	Other forms of scoliosis, lumbosacral region
M41.9	Scoliosis, unspecified
M41.9	Scoliosis, unspecified
M96.5	Postradiation scoliosis
Q67.5	Congenital scoliosis NOS
Q76.2	Congenital spondylolisthesis
Q76.3	Congenital scoliosis due to congenital bony malformation
Q76.425	Congenital lordosis, thoracolumbar region
Q76.49	Other congenital malformations of spine, not associated with scoliosis
Q76.6	Other congenital malformations of ribs (includes accessory rib, congenital absence of rib, congenital fusion of ribs, and congenital malformation of rib NOS)
Q76.7	Congenital malformation of sternum
Q76.8	Other congenital malformations of bony thorax
Q76.9	Congenital malformation of bony thorax, unspecified

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ICD-10-CM Diagnosis Codes	Description
Q77.2	Short rib syndrome
Q77.4	Achondroplasia
Q77.6	Chondroectodermal dysplasia
Q78.9	Osteochondrodysplasia, unspecified
Q79.8	Other congenital malformations of musculoskeletal system
Q79.9	Congenital malformation of musculoskeletal system, unspecified
Q87.2	Congenital malformation syndromes predominantly involving limbs (includes VATER syndrome)
S22.5XXA-S22.5XXS	Flail chest

REFERENCES

1. *Food and Drug Administration. Vertical Expandable Prosthetic Titanium Rib (VEPTR). 2004; https://www.accessdata.fda.gov/cdrh_docs/pdf14/k142587.pdf. Accessed February 21, 2025.*
2. *Food and Drug Administration. RESPONSE Rib and Pelvic System. 2024; https://www.accessdata.fda.gov/cdrh_docs/pdf23/K233105.pdf. Accessed February 20, 2025.*
3. *Campbell RM, Smith MD, Mayes TC, et al. The characteristics of thoracic insufficiency syndrome associated with fused ribs and congenital scoliosis. J Bone Joint Surg Am. Mar 2003; 85(3): 399-408. PMID 12637423*
4. *Campbell RM. VEPTR: past experience and the future of VEPTR principles. Eur Spine J. Mar 2013; 22 Suppl 2(Suppl 2): S106-17. PMID 23354777*
5. *Campbell RM, Smith MD, Mayes TC, et al. The effect of opening wedge thoracostomy on thoracic insufficiency syndrome associated with fused ribs and congenital scoliosis. J Bone Joint Surg Am. Aug 2004; 86(8): 1659-74. PMID 15292413*
6. *Flynn JM, Emans JB, Smith JT, et al. VEPTR to treat nonsyndromic congenital scoliosis: a multicenter, mid-term follow-up study. J Pediatr Orthop. 2013; 33(7): 679-84. PMID 23812154*
7. *Gadepalli SK, Hirschl RB, Tsai WC, et al. Vertical expandable prosthetic titanium rib device insertion: does it improve pulmonary function?. J Pediatr Surg. Jan 2011; 46(1): 77-80. PMID 21238644*
8. *Emans JB, Caubet JF, Ordonez CL, et al. The treatment of spine and chest wall deformities with fused ribs by expansion thoracostomy and insertion of vertical expandable prosthetic titanium rib: growth of thoracic spine and improvement of lung volumes. Spine (Phila Pa 1976). Sep 01 2005; 30(17 Suppl): S58-68. PMID 16138067*
9. *Motoyama EK, Deeney VF, Fine GF, et al. Effects on lung function of multiple expansion thoracoplasty in children with thoracic insufficiency syndrome: a longitudinal study. Spine (Phila Pa 1976). Feb 01 2006; 31(3): 284-90. PMID 16449900*

10. *Waldhausen JH, Redding GJ, Song KM. Vertical expandable prosthetic titanium rib for thoracic insufficiency syndrome: a new method to treat an old problem. J Pediatr Surg. Jan 2007; 42(1): 76-80. PMID 17208544*
11. *Skaggs DL, Sankar WN, Albrektson J, et al. Weight gain following vertical expandable prosthetic titanium ribs surgery in children with thoracic insufficiency syndrome. Spine (Phila Pa 1976). Nov 01 2009; 34(23): 2530-3. PMID 19927103*
12. *Mayer OH, Redding G. Early changes in pulmonary function after vertical expandable prosthetic titanium rib insertion in children with thoracic insufficiency syndrome. J Pediatr Orthop. 2009; 29(1): 35-8. PMID 19098643*
13. *Peiro-Garcia A, Bourget-Murray J, Suarez-Lorenzo I, et al. Early Complications in Vertical Expandable Prosthetic Titanium Rib and Magnetically Controlled Growing Rods to Manage Early Onset Scoliosis. Int J Spine Surg. Apr 2021; 15(2): 368-375. PMID 33900996*
14. *Dede O, Motoyama EK, Yang CI, et al. Pulmonary and Radiographic Outcomes of VEPTR (Vertical Expandable Prosthetic Titanium Rib) Treatment in Early-Onset Scoliosis. J Bone Joint Surg Am. Aug 06 2014; 96(15): 1295-1302. PMID 25100777*
15. *Farley FA, Li Y, Jong N, et al. Congenital scoliosis SRS-22 outcomes in children treated with observation, surgery, and VEPTR. Spine (Phila Pa 1976). Oct 15 2014; 39(22): 1868-74. PMID 25099323*
16. *El-Hawary R, Kadhim M, Vitale M, et al. VEPTR Implantation to Treat Children With Early-Onset Scoliosis Without Rib Abnormalities: Early Results From a Prospective Multicenter Study. J Pediatr Orthop. Dec 2017; 37(8): e599-e605. PMID 28141685*
17. *El-Hawary R, Morash K, Kadhim M, et al. VEPTR Treatment of Early Onset Scoliosis in Children Without Rib Abnormalities: Long-term Results of a Prospective, Multicenter Study. J Pediatr Orthop. Jul 2020; 40(6): e406-e412. PMID 32501900*
18. *Bowen M, Desai V, Anari JB, et al. Evaluation and Treatment of Thoracic Insufficiency Syndrome and Early-Onset Scoliosis. J Clin Med. Jan 24 2025; 14(3). PMID 39941426*
19. *White KK, Song KM, Frost N, et al. VEPTR™ growing rods for early-onset neuromuscular scoliosis: feasible and effective. Clin Orthop Relat Res. May 2011; 469(5): 1335-41. PMID 21213088*
20. *Waldhausen JH, Redding G, White K, et al. Complications in using the vertical expandable prosthetic titanium rib (VEPTR) in children. J Pediatr Surg. Nov 2016; 51(11): 1747-1750. PMID 27397045*

POLICY HISTORY

MP 1.136	**08/19/2020 Consensus Review.** Policy statement unchanged. Policy Guidelines and Rationale updated. References updated.
	03/24/2021 Consensus Review. Policy statement unchanged. Coding reviewed
	04/22/2022 Consensus Review. Rationale and references updated. No changes to coding.
	05/17/2023 Consensus Review. Updated background and references. No changes to coding.
	05/14/2024 Consensus Review. No changes to coding.

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	04/07/2025 Consensus Review. Editorial refinements to policy statement; no change to intent. No changes to coding. Updated background and references.
	04/28/2026 Consensus Review. Removed cross references. Updated summary of evidence and references. No changes to coding.