

## Evidence Discussion (CMM-312)

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Risks of procedures for high tibial osteotomy include but are not limited to fracture, failure to improve, non-union or malunion, neurovascular injury, compartment syndrome, loss of knee flexion, pain, fixation device complications, hematoma, hemarthrosis, arthrofibrosis, wound complications, infection, deep venous thrombosis, pulmonary embolism, and death [1, 2, 3, 4]. Complications related to risks of general and local anesthesia are also present.

Given the potential possibility for significant complications, as high as 30% in recent studies, proper patient selection is crucial to minimize the risk-benefit ratio. [3, 4, 5] The American Academy of Orthopaedic Surgeons (AAOS) has developed Clinical Practice Guidelines and Appropriate Use Criteria for the management of osteoarthritis of the knee to guide both nonsurgical and surgical treatment and provide risk assessment tools to help ensure patients receive treatment that is appropriate, safe and effective. [10-13] Conservative treatment is recommended by the AAOS Appropriate Use Criteria (AUC) for the Management of Osteoarthritis of the Knee for multiple clinical scenarios. [11] Treatment recommendations in the AAOS AUC are based on multiple variables including but not limited to function limiting pain frequency/predictability and radiographic severity of osteoarthritis. [10, 11]

Physical exam findings for potential candidates for high tibial osteotomy should demonstrate less than 15 degrees of varus deformity, at least 90 degrees of flexion, joint stability in full extension and ACL stability [7, 8, 9]

Imaging should confirm findings on MRI/CT arthrogram and standing long leg alignment x-rays amenable to high tibial osteotomy including chondral loss, and varus or valgus misalignment that corresponds to the patient's symptoms and physical examination. [3] Imaging should also demonstrate the absence of severe articular destruction. [9]

It has been shown that many patients may improve with a course of conservative care and this may very well obviate the need for surgical treatment. [6] Non-surgical management for unicompartmental osteoarthritis pain may include extensive physical therapy and muscle strengthening as well as bracing, injections and NSAID medication. [6, 13, 15]

Outcomes after high tibial osteotomy have been favorable, with survival rates of the osteotomy up to 85% at 20 years, although patients over 50 with higher levels of unicompartmental osteoarthritis had better outcomes and lower failure rates with arthroplasty. [3]

Contraindications to high tibial osteotomy include inflammatory arthropathy and chondrocalcinosis. [14]

As risk for major complications exists, symptoms, physical exam findings and imaging findings should support surgical intervention. Although the use of any coverage criteria includes the possible risk of delayed care, EviCore firmly believes the benefits of our evidence-based criteria best ensure patient safety and highly outweigh any clinical harms.

1. Miltenberg B, Puzzitiello RN, Ruelos VCB, Masood R, Pagani NR, Moverman MA, Menendez ME, Ryan SP, Salzler MJ, Drager J. Incidence of Complications and Revision Surgery After High Tibial Osteotomy: A Systematic Review. *Am J Sports Med.* 2024 Jan;52(1):258-268.
2. Woodacre T, Ricketts M, Evans JT, Pavlou G, Schranz P, Hockings M, Toms A. Complications associated with opening wedge high tibial osteotomy--A review of the literature and of 15 years of experience. *Knee.* 2016 Mar;23(2):276-82.
3. Pullen, W. Michael MD; Slone, Harris MD; Abrams, Geoff MD; Sherman, Seth L. MD. High Tibial Osteotomy in Knee Reconstruction and Joint Preservation. *Journal of the American Academy of Orthopaedic Surgeons* 32(13):p 577-586, July 1, 2024. | DOI: 10.5435/JAAOS-D-23-00323
4. Hoellwarth, Jason Shih MD; Geffner, Adam BS; Fragomen, Austin T. MD; Reif, Taylor J. MD; Rozbruch, S. Robert MD. Avoiding Compartment Syndrome, Vascular Injury, and Neurologic Deficit in Tibial Osteotomy: An Observational Study of 108 Limbs. *JAAOS: Global Research and Reviews* 7(11):e23.00075, November 2023. | DOI: 10.5435/JAAOSGlobal-D-23-00075
5. Murray, Ryan MD; Winkler, Philipp W. MD; Shaikh, Humza S. MD; Musahl, Volker MD. High Tibial Osteotomy for Varus Deformity of the Knee. *JAAOS: Global Research and Reviews* 5(7):e21.00141, July 2021. | DOI: 10.5435/JAAOSGlobal-D-21-00141
6. Jones BQ, Covey CJ, Sineath MH Jr. Nonsurgical Management of Knee Pain in Adults. *Am Fam Physician.* 2015 Nov 15;92(10):875-83.
7. Herman BV, Giffin JR. High tibial osteotomy in the ACL-deficient knee with medial compartment osteoarthritis. *J Orthop Traumatol.* 2016 Sep;17(3):277-85.
8. Sabzevari S, Ebrahimpour A, Roudi MK, Kachooei AR. High Tibial Osteotomy: A Systematic Review and Current Concept. *Arch Bone Jt Surg.* 2016 Jun;4(3):204-12.
9. Liu X, Chen Z, Gao Y, Zhang J, Jin Z. High Tibial Osteotomy: Review of Techniques and Biomechanics. *J Healthc Eng.* 2019 May 2;2019:8363128.
10. American Academy of Orthopaedic Surgeons Surgical Management of Osteoarthritis of the Knee Appropriate Use Criteria. [aaos.org/smoakauc](http://aaos.org/smoakauc) Published December 9, 2016.
11. American Academy of Orthopaedic Surgeons Management of Osteoarthritis of the Knee Appropriate Use Criteria. <https://www.aaos.org/oakauc> Published 09/11/2022.
12. American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee EvidenceBased Clinical Practice Guideline. <http://www.aaos.org/smoak2cpg>. Published 12/02/2022.
13. American Academy of Orthopaedic Surgeons Management of Osteoarthritis of the Knee (Non-Arthroplasty) Evidence-Based Clinical Practice Guideline. <https://www.aaos.org/oak3cpg> Published 08/31/2021.
14. Takahara Y, Nishida K, Nakashima H, Ochi N, Uchida Y, Kato H, Itani S, Nakamura M, Iwasaki Y, Tsujimura Y. Two Cases of High Tibial Osteotomy in Patients with Rheumatoid Arthritis Treated with Biologic Disease-modifying Anti-rheumatic Drugs. *Acta Med Okayama.* 2019 Dec;73(6):537-542.

15. Allaeyns C, Arnout N, Van Onsem S, Govaers K, Victor J. Conservative treatment of knee osteoarthritis. *Acta Orthop Belg.* 2020 Sep;86(3):412-421.