Core decompression for avascular necrosis of the hip

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Recent review date: 12/2025

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Policy contains: Avascular necrosis, core decompression; femoral head; osteonecrosis.

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Coverage policy

Core decompression of the hip (femoral head and/or femoral neck) is clinically proven and, therefore, may be medically necessary for treating avascular necrosis when the disease is in the early stage (pre-collapse stage 0, I and II) (American Academy of Orthopaedic Surgeons, 2022; Hua, 2019).

Core decompression is investigational/not clinically proven and, therefore, not medically necessary for treating late stage avascular necrosis of the femoral head.

For any determinations of medical necessity for medications, refer to the applicable state-approved pharmacy policy.

Limitations

No limitations were identified during the writing of this policy.

Alternative covered services

- Anti-coagulants.
- Biophysical treatments.
- Bisphosphonates.
- Nonsteroidal anti-inflammatory drugs.
- Statins.
- Vascularized bone graft.
- Total hip arthroplasty.

Background

Avascular necrosis, also known as osteonecrosis, aseptic necrosis, and ischemic necrosis, is caused by the loss of blood supply to the bone, leading to the bone deteriorating more quickly than it can regrow (Moya-Angeler, 2015; National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2021). Various traumatic and atraumatic factors have been identified as risk factors for avascular necrosis.

The prognosis for people with avascular necrosis depends on how much of the bone is affected, and how well the bone rebuilds itself. However, without treatment, the disease typically worsens, resulting in continued deterioration of the affected bone/s and joint/s. It is typical for people with the disease to have severe pain and limited movement over time . Radiographic imaging, computerized tomography, magnetic resonance tomography, and scintigraphy are useful in determining disease progression (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2021).

Several classification systems are available to assist in staging femoral head osteonecrosis. The most commonly used classification systems include the Ficat and Arlet classification and the Steinberg University of Pennsylvania classification system, both of which describe four stages of disease progression based on clinical and radiographic findings in varying detail (Matthews, 2023). The Association Research Circulation Osseous/Subcommittee of Nomenclature of the International Association on Bone Circulation and Bone Necrosis staging system, known as “ARCO,” is frequently used based on imaging findings, and was last revised in 2019 (Yoon, 2020). The use of different staging criteria complicates the comparative analysis of treatment effects across studies.

Treatment options include medications such as bisphosphonates and statins, biophysical treatments, and surgery. Surgery to treat avascular necrosis of the femoral head may be either femoral head sparing or femoral head replacement. Femoral head sparing procedures are indicated at pre-collapse stages when the patient has minimal symptoms, while femoral head replacement procedures are indicated when the joint has collapsed. Core decompression, a femoral head sparing procedure, consists of drilling one or more small channels into the dead bone. The procedure is designed to decrease pressure within the bone by restoring blood flow to the bone. Bone grafting may or may not be used with core decompression (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2021).

In the United States from 2010 to 2020, a nationwide survey (n = 64,739) of trends in the surgical management of osteonecrosis of the femoral head found 94.1% were arthroplasty procedures and 5.9% were joint-preserving procedures. The use of core decompression significantly increased from 4.2% to 4.6% (P = .017) and was performed more often among patients younger than 50 years than among older cohorts (10.2% versus 2.4%). However, the investigators were unable to correlate disease stage with operative management (Ng, 2023).

Findings

Effective early intervention, when the deterioration of the femoral head has not yet advanced to collapse, could prevent further damage to the femoral head and hip joint. However, identifying the appropriate treatment to effectively manage avascular necrosis of the femoral head is challenging due to the paucity of Level 1 evidence.

Guidelines

Core decompression can be performed in various locations including the femoral head, and can use autologous bone marrow cell injection, vascular fibular grafting, or electric stimulation adjunctively. However, overall efficacy of core decompression at preventing eventual articular collapse remains controversial (American College of Radiology, 2022).

Core decompression achieves the best results for early-stage osteonecrosis in preventing collapse of the femoral head and the development of arthritis. Core decompression is often combined with vascularized fibular grafting to help regenerate healthy bone and support cartilage at the hip joint (American Academy of Orthopaedic Surgeons, 2022).

Evidence review

Core decompression performed as an open procedure or arthroscopically is safe in experienced hands and may be effective in delaying femoral head collapse, promoting functional recovery, and improving long-term clinical outcomes. However, much of the evidence is limited by its retrospective nature and low methodological quality and lacks detail of important patient factors such as age, etiology, and disease stage. There is insufficient evidence to determine the superiority of one adjunctive treatment over another.

The evidence is based primarily on a systematic review of 32 studies in which 1,865 individuals participated. A total of 2,441 hips were included. In 22 studies, 1,379 hips were treated with core decompression alone. In seven studies, 565 hips were treated with core decompression combined with autologous bone, while in nine studies, 497 hips were treated with core decompression combined with autologous bone marrow. The following findings suggest that the overall success rate, conversion to total hip replacement, and radiographic progression vary significantly based on the adjunctive treatments and staging criteria used. More data are needed in order to determine which combination of treatment is most useful and in which population. Outcomes were reported as effect size (95% confidence interval) (Hua, 2019):

- The overall pooled success rate was 0.65. Success was defined as a Harris hip score ≥ 70 during follow-up, no further total hip replacement surgery required, or no radiographic progression. Success rates according to treatment were 0.57 (0.50 to 0.61) for core decompression alone, 0.74 (0.66 to 0.83) for core decompression plus bone marrow, and 0.81 (0.69 to 0.92) for core decompression and autologous bone marrow.
- Conversion to total hip replacement was documented in 27 studies (2,120 hips) with a pooled overall conversion rate of .28 (0.22 to 0.34). Subgroup analyses according to treatment showed conversion rates of 0.34 (0.26 to 0.42), 0.16 (0.08 to 0.24), and 0.18 (0.02 to 0.34) for core decompression alone, core decompression plus bone marrow, and core decompression plus autologous bone marrow, respectively ($P < .05$).
- Radiographic progression was documented in 26 studies (1,752 hips). Three of the 26 studies were randomized clinical trials. Follow-up periods ranged from 16 to 132 months. Twenty-one studies reported complications (69 total cases). In subgroup analysis by treatment, the conversion rates were 0.43 (0.32 to 0.54) for core decompression alone, 0.27 (0.17 to 0.32) for core decompression plus bone marrow, and 0.18 (0.02 to 0.35) in for core decompression plus autologous bone marrow.

- A meta-analysis included studies using Ficat (n = 21), Association Research Circulation Osseous (n = 7), and University of Pennsylvania (n = 4) staging. In a subgroup analysis, the success rate among those staged in Ficat I (78.29%) was superior to the success rate in Ficat II (59.38%), which was itself superior to the success rate Ficat III (27.44%) (differences statistically significant).

Core decompression along with bone marrow aspirate concentrate was studied in later (post collapse) stages of avascular necrosis of hip. A systematic review and meta-analysis compared radiographic progression along with the need for total hip replacement and core decompression alone. The review included 12 studies. Out of the 270 hips, 196 were treated with core decompression combined with bone marrow aspirate concentrate. Of these, 39.8% worsened from stage three to four, with an overall incidence of total hip replacement of 38.3% in stages three and four. The authors concluded that core decompression can be considered in a younger population to delay total hip replacement, with (late) stage three avascular necrosis before severe femoral head distortion or arthritis sets in (Jindal, 2021).

Multiple systematic reviews have found inconclusive or conflicting results of the benefits of adjunctive regenerative therapies such as bone marrow stem cells, bone graft, tantalum rod implantation, cell therapies, and vascularized bone grafts. In addition, long-term results were lacking (Andronic, 2021; Cao, 2025; Li, 2023; Liu, 2021; Saini, 2023; Tang, 2024; Wang, 2024).

A meta-analysis of fourteen randomized and nonrandomized controlled studies (n = 1,063) compared the clinical efficacy and safety of arthroscopically-assisted core decompression to open core depression for osteonecrosis of the femoral head in adult populations. There were no significant differences between the two groups in terms of intraoperative blood loss, length of hospital stay, 12-month postoperative Harris hip score, or overall postoperative complication rate (all $P > 0.05$). There were significant differences in operative time ($P = 0.02$), favoring the open procedure, and in the overall postoperative femoral head collapse rate ($P = 0.02$) and Harris hip function scores measured at three months, six months, ≥ 24 months, and at last follow-up (all $P < 0.00001$), favoring the arthroscopic approach (Ouyang, 2024).

In 2020, we updated the references. The results confirm previous findings and warrant no additional policy changes.

In 2021 we updated the references with no policy changes warranted.

In 2022, we updated the references. No policy changes are warranted.

In 2023, we updated the references with no policy changes needed.

In 2024, we updated the references with no policy changes needed.

In 2025, we reorganized the findings and updated the references with no policy changes needed.

References

On October 17, 2025, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were "decompression, surgical (MeSH)," "osteonecrosis (MeSH)," "osteonecrosis," "femoral head," and "avascular necrosis". We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

American College of Radiology. ACR Appropriateness Criteria®. Osteonecrosis. https://acsearch.acr.org/docs/69420/Narrative/. Published 2022.

American Academy of Orthopaedic Surgeons. OrthoInfo. Osteonecrosis of the hip. https://orthoinfo.aaos.org/en/diseases--conditions/osteonecrosis-of-the-hip. Last reviewed March 2022.

Andronic O, Hincapié CA, Burkhard MD, et al. Lack of conclusive evidence of the benefit of biologic augmentation in core decompression for nontraumatic osteonecrosis of the femoral head: A systematic review. *Arthroscopy*. 2021;37(12):3537-3551.e3. Doi: 10.1016/j.arthro.2021.04.062.

Cao Y, Deng X, Hou S, et al. Efficacy and safety of platelet-rich plasma combined with core decompression and enhanced bone grafting versus core decompression with enhanced bone grafting alone in treating femoral head necrosis: A systematic review and meta-analysis. *J Orthop Surg Res.* 2025;20(1):354. Doi: 10.1186/s13018-025-05755-7.

Hong YC, Zhong HM, Lin T, Shi JB. Comparison of core decompression and conservative treatment for avascular necrosis of femoral head at early stage: A meta-analysis. *Int J Clin Exp Med.* 2015;8(4):5207-5216. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4483944/pdf/ijcem0008-5207.pdf.

Hua KC, Yang XG, Feng JT, et al. The efficacy and safety of core decompression for the treatment of femoral head necrosis: A systematic review and meta-analysis. *J Orthop Surg Res.* 2019;14(1):306. Doi: 10.1186/s13018-019-1359-7.

Jindal K, Aggarwal S, Kumar P, Rathod P. Core decompression with bone marrow aspirate concentrate in post collapse avascular necrosis of hip: A systematic review and meta-analysis. *J Clin Orthop Trauma*. 2021;17:78-87. Doi: 10.1016/j.jcot.2021.02.010.

Li M, Chen D, Ma Y, Zheng M, Zheng Q. Stem cell therapy combined with core decompression versus core decompression alone in the treatment of avascular necrosis of the femoral head: A systematic review and meta-analysis. *J Orthop Surg Res*. 2023;18(1):560. Doi: 10.1186/s13018-023-04025-8.

Liu Q, Guo W, Li R, Lee JH. Efficacy of various core decompression techniques versus non-operative treatment for osteonecrosis of the femoral head: A systemic review and network meta-analysis of randomized controlled trials. *BMC Musculoskelet Disord*. 2021;22(1):948. Doi: 10.1186/s12891-021-04808-2.

Matthews AH, Davis DD, Fish MJ, et al. Avascular Necrosis. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. National Center for Biotechnology Information website. https://www.ncbi.nlm.nih.gov/books/NBK537007/. Updated August 28, 2023.

Moya-Angeler J, Gianakos AL, Villa JC, Ni A, Lane JM. Current concepts on osteonecrosis of the femoral head. *World J Orthop*. 2015;6(8):590-601. Doi: 10.5312/wjo.v6.i8.590.

National Institute of Arthritis and Musculoskeletal and Skin Diseases. Osteonecrosis. https://www.niams.nih.gov/health-topics/osteonecrosis. Last reviewed January 2021.

Ng MK, Gordon AM, Piuzzi NS, Wong CHJ, Jones LC, Mont MA. Trends in surgical management of osteonecrosis of the femoral head: A 2010 to 2020 nationwide study. *J Arthroplasty*. 2023;38(7s):S51-s57. Doi: 10.1016/j.arth.2023.03.071.

Ouyang W, Guo G, Xia J, Zhao C, Zhou X. Arthroscopic assisted versus open core decompression for osteonecrosis of the femoral head: A systematic review and meta-analysis. *PLoS One*. 2024;19(11):e0313265. Doi: 10.1371/journal.pone.0313265.

Saini U, Jindal K, Rana A, Aggarwal S, Kumar P, Sharma S. Core decompression combined with intralesional autologous bone marrow derived cell therapies for osteonecrosis of the femoral head in adults: A systematic review and meta-analysis. *Surgeon*. 2023;21(3):e104-e117. Doi: 10.1016/j.surge.2022.04.010.

Steinberg D, Steinberg M. The University of Pennsylvania Classification of Osteonecrosis. In Osteonecrosis. Eds. Koo et al. 2014:201-206. Radiology Key website. https://radiologykey.com/the-university-of-pennsylvania-classification-of-osteonecrosis/. Published March 18, 2017.

Tang H, Ling T, Zhao E, et al. The efficacy of core decompression combined with regenerative therapy in early femoral head necrosis: A systematic review and meta-analysis involving 954 subjects. *Front Pharmacol*. 2024;15:1501590. Doi: 10.3389/fphar.2024.1501590.

Wang X, Hu L, Wei B, Wang J, Hou D, Deng X. Regenerative therapies for femoral head necrosis in the past two decades: A systematic review and network meta-analysis. *Stem Cell Res Ther*. 2024;15(1):21. Doi: 10.1186/s13287-024-03635-1.

Yoon BH, Mont MA, Koo KH, et al. The 2019 revised version of Association Research Circulation Osseous Staging System of osteonecrosis of the femoral head. *J Arthroplasty*. 2020;35(4):933-940. Doi: 10.1016/j.arth.2019.11.029.

Policy updates

12/2019: initial review date and clinical policy effective date: 2/2020

12/2020: Policy references updated. Coverage modified.

12/2021: Policy references updated.

12/2022: Policy references updated.

12/2023: Policy references updated.

12/2024: Policy references updated.

12/2025: Policy references updated.