

Positional Magnetic Resonance Imaging (MRI)

Effective: April 1, 2024

Next Review: February 2025

Last Review: February 2024

IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

Positional MRI (pMRI) acquires images in multiple positions in addition to conventional horizontal imaging. It allows weight-bearing and movement-based images.

MEDICAL POLICY CRITERIA

Positional or upright MRI for the diagnosis and management of any condition, including but not limited to cervical, thoracic or lumbosacral back pain, is considered **investigational**.

NOTE: A summary of the supporting rationale for the policy criteria is at the end of the policy.

CROSS REFERENCES

None

BACKGROUND

It is theorized that imaging the body in positions related to the central loading of the spine, which occurs when standing upright or sitting or in the specific position related to the patient's clinical symptoms, may lead to more accurate diagnosis. This is being evaluated in patients

with suspected nerve root compression and in some cases of spondylolisthesis, and may be particularly relevant in cases where disease is not visible on a horizontal MRI.

One concern with positional MRI is the field strength of the scanners. Today's clinical MRI scanners may operate at a field strength between 0.1 Tesla (T) to 3 T and are classified as either low-field (<0.5 T), mid-field (0.5-1.0 T), or high-field (>1.0 T). Low- to mid-field MRI is typically used in open scanners. Open scanners are designed for use during interventional or intraoperative procedures, when a conventional design is contraindicated (e.g., an obese or claustrophobic patient), or for changes in patient positioning.

In general, higher field strength results in an increase in signal-to-noise ratio, spatial resolution, contrast and speed. Thus, low-field scanners produce poorer-quality images compared to high-field scanners, and the longer acquisition times with low-field scanners increases the possibility of image degradation due to patient movement. However, field strength has less of an effect on the contrast-to-noise ratio, which determines the extent to which adjacent structures can be distinguished from one another. It may be possible, because of the pMRI technology to diagnose conditions not seen on a conventional or open MRIs.

REGULATORY STATUS

Several MRI systems have been cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process as open or total body systems for positional imaging. One such system is FONAR's Upright® MRI. FDA product code: LNH.^[1, 2]

EVIDENCE SUMMARY

In evaluating positional MRI, it is important to evaluate if this approach results in improved clinical management of the patient compared to other standard imaging.

Randomized controlled trials (RCTs) are needed to determine the following:

- Characteristics of patients who might benefit from positional MRI studies;
- Clinical benefit of basing treatment decisions, including surgery, on these additional findings; and
- How this technique might replace current diagnostic tests such as myelography.

SYSTEMATIC REVIEWS

Earlier systematic reviews (SR)s indicate that the literature on kinetic MRI consists primarily of examining anatomic changes in neutral, flexion, extension, and axial rotation. These do not address how anatomical changes detected by positional MRI lead to improved health outcomes. Lord (2014) reviewed 16 studies using kinetic MRI on the cervical spine and identified changes in neuroforaminal size, cord compression, cord length, cross-sectional area, ligamentum flavum thickness, and motion at the index and adjacent levels when comparing symptomatic and asymptomatic individuals^[3]. Lao (2014) reviewed 11 studies that used kinetic MRI on lumbar and cervical spine on symptomatic individuals, but reported high study bias, since all studies were performed at the same institution.^[4] Both these reviews highlighted the need for studies comparing kinetic and traditional MRI in order to establish the clinical utility of kinetic MRI.

A SR of emerging MRI technologies for musculoskeletal imaging under loading stress was prepared by the Tufts Medical Center Evidence-based Practice Center for the Agency for

Healthcare Research and Quality (AHRQ) in 2011.^[5] The review analyzed 57 studies using MRI under physiologic loading stress in an upright or sitting position or under axial load using a compression device. The majority of studies (37 cross-sectional studies and 13 case-control studies) reported on the anatomical measurements rather than patient-relevant endpoints. The most commonly imaged body region was the lumbar spine. Fifteen of 57 studies used at least two imaging tests and reported on diagnostic or patient-relevant outcomes but did not report meaningful information on the relative performance of the tests. The potential effect on image quality of low magnetic field strengths (<0.6 Tesla) in weight-bearing MRI scanners was not assessed. In 10 studies that included information on adverse effects, 5% to 15% of participants reported new-onset or worsening pain and neuropathy during MRI under loading stress. The SR concluded that, despite the large number of available studies, the evidence is insufficient to support the clinical utility of MRI under loading stress for musculoskeletal conditions.

RANDOMIZED CONTROLLED TRIALS

There are no RCTs comparing how the use of positional MRI versus other standard imaging alters patient treatment plans or health outcomes.

NON-RANDOMIZED STUDIES

Kaya (2022) evaluated whether positional MRI would improve diagnosis of cervical foraminal stenosis in patients with neck and shoulder pain.^[6] The MRI procedure was divided into two-steps. During the first step the patient was in the usual supine position with neck in the neutral position. During the second step positional MRI was performed using a collar to maximize neck flexion and extension. Spinal cord diameters at the C5-C6 foraminal level on the affected side compared to the opposite side were not significantly different ($p>0.05$). Therefore, the use of positional MRI did not provide additional insight into the cause of the patients' pain or aid in diagnosis.

In a study by Charoensuk (2021), 54 patients suspected of having spinal stenosis underwent both standing MRI and MRI plus axial loading using a compression device.^[7] Primary outcome measures included measures of the intervertebral disc (ie, cross-sectional area [DA], disc height [DH], and anteroposterior distance [DAP]), dural sac (cross-sectional area [DCSA]), spinal curvature (ie, lumbar lordosis [LL] and L1-L3-L5 angle [LA]), and total lumbar spine height (LH). Results showed that there was a major difference observed with LL, but minor differences observed in DCSA, DAP, DA, LA, and LH. This suggests that the standing position might be adequately simulated while recumbent by utilizing an axial-loaded MRI using a compression device.

SECTION SUMMARY

Some studies have reported that positional MRI may show abnormalities in patients which were not seen with conventional MRI. One study evaluated the use of an MRI-protocol that may simulate standing MRI. However, no studies indicated how positional MRI changed or affected the patient's treatment plan thereby impacting health outcomes.^[6-37]

PRACTICE GUIDELINE SUMMARY

AMERICAN COLLEGE OF RADIOLOGY

In 2018, the American College of Radiology (ACR) published an updated guideline in collaboration with the American Society of Neuroradiology (ASNR), the Society of Computed

Body Tomography and Magnetic Resonance (SCBT-MR), and the Society for Skeletal Radiology (SSR).^[38] This guideline states that there is insufficient supportive evidence that the use of positional MRI (referred in the guideline as kinematic or dynamic) correlates with individual patient symptoms or improves patient outcomes after therapy.

SUMMARY

There is not enough research to show that positional or upright MRI improves health outcomes for people with any condition, including but not limited to cervical, thoracic or lumbosacral back pain. In addition, no practice guidelines recommend positional or upright MRI. Therefore, positional MRI is considered investigational.

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CODES

NOTE: There is no specific code for positional MRI, which should be reported with an unlisted procedures code such as 76498.

Codes	Number	Description
CPT	76498	Unlisted magnetic resonance procedure (eg, diagnostic, interventional)
HCPCS	None	

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