February 5th, 2014

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Dear Dr. Rosen,

The American Society of Neuroradiology (ASNR) represents over 5,000 physicians specializing in diagnostic imaging and image-guided intervention of diseases of the brain, spine, and head and neck.

The American Society of Spine Radiology (ASSR) consists of over 650 members fostering education and research in spine imaging and imaging guided therapy of the spine. The overall objectives of the ASSR include developing and supporting the care of patients undergoing spine imaging-related procedures and the nurturing of high standards of practice, research, and education.

The American College of Radiology (ACR) is a professional society with 36,000 members, drawn from radiologists, radiation oncologists, medical physicists, interventional radiologists, nuclear medicine physicians and allied health professionals. For over three quarters of a century, the ACR has devoted its resources to making imaging safe, effective and accessible to those who need it.

Our societies appreciate the opportunity to comment about proposed National Correct Coding Initiative (NCCI) edits that would disallow same-day coding of myelogram supervision and interpretation (S&I) codes (CPT codes 72240, 72255, 72265, and 72270) with any of the spine computed tomography (CT) CPT codes (72125-72133). Your letter of 12/5/13 to the American College of Radiology states: “CMS thinks that providers are incorrectly reporting myelography CPT codes when performing a CT of the spine with intrathecal contrast. CMS proposes that the edits not allow use of NCCI-associated modifiers since it is unlikely that a provider would perform a CT of spine with intrathecal contrast and a separate myelogram requiring intrathecal contrast at a separate patient encounter on the same date of service.”

In fact, performing both services (i.e., one of the myelography S&I services and one of the CT procedures listed above) and reporting both codes on the same day is NOT an error, but reflects one pathway of clinical practice. We would like to detail the arguments for maintaining both myelography and spine CT as two distinctly reportable procedures, each valuable to the care of the spine patient.
Historically, myelographic fluoroscopic and plain film images were the initial imaging representation achieved of the spinal canal, obtained during and following intrathecal myelographic contrast administration. When the technology became available, CT imaging with intrathecal contrast found utility in supplementing the myelographic examination. These two types of images are complementary, but differ in their display of the spinal canal and its contents; each contributing unique information to the assessment of the spine. Real-time fluoroscopic monitoring during contrast injection, and subsequent myelographic imaging, can provide important information that significantly enhances the diagnostic sensitivity and specificity of spine assessment over that of a post-injection CT alone.

There are four overarching reasons why myelography remains a valuable exam separate and in addition to a post-injection CT. First, the ability to perform dynamic imaging; second, the necessity of observing contrast flow, diffusion, and thecal sac filling in real time; third, the ability to overcome hardware artifact and other post-surgical changes that can limit the diagnostic efficacy of CT; and fourth, clinician preference, most commonly for surgical planning purposes. In further detail:

1. **Myelography allows assessment of the spinal canal in multiple positions, unlike a post-injection CT that is performed with the patient static and usually in supine position.** A typical myelographic exam usually includes prone and oblique projections; utilizing a tilting table, which allows imaging in weight-bearing and natural lordosis; and can include positioning with physiologic motion, such as flexion, extension, and lateral bending. Many patients have symptoms that correlate with symptomatic nerve root impingement that are only recognizable in particular positions, and are not demonstrable with CT alone. These dynamic and positioning options provide critical patho-anatomic information on the alteration of spinal canal size and shape that contributes to nerve root compression from central spinal stenosis, lateral recess entrapment, and/or foraminal impingement, as well as demonstrating subluxation or spondylolisthesis that may resolve in supine positioning used for CT. For example, lateral recess stenosis causing isolated nerve root compression is frequently better-visualized on myelography than on CT or MRI imaging. The lack of visualization of the lateral recess is likely one of the reasons that the SPORT trial failed in diagnosis and treatment of this anatomy/pathology in the elderly spine patient with radiculopathy.¹

2. **Visualization and myelographic fluoroscopic documentation of contrast flow and distribution.** Proper myelogram technique with recording of the locations of contrast infusion and correct documentation of areas of spinal canal impingement, compression or constriction requires both observation of contrast flow and distribution in the spinal canal as well as image recording and report documentation of the observations. Examples follow:

   a. An area of moderate or severe spinal stenosis will cause a partial or complete block to the intrathecal flow of contrast. Observation of this delay in contrast diffusion, and the efforts required by the radiologist to overcome this block (including table tilting, changing the patient’s position)—*and the time involved to do this*—are integral parts of
a myelographic evaluation, and of critical importance to the treating clinician. The degree of nerve root crowding and compression at and below a relative block is a biomechanical observation made most effectively during a myelogram. Again, contrast filling of the thecal sac may appear normal (or significantly less abnormal) on CT, obscuring the anatomic and physiologic effects of patient positioning that are often a critical feature of the patient’s clinical condition.

b. Intrathecal contrast does not distribute normally in the setting of arachnoiditis due to membranes, adhesions, and scarring of the nerve roots. Irregular filling and diffusion of contrast will be seen fluoroscopically; these findings may be subtle (such as in the lateral recess and root sleeves) and transient, and could be missed on subsequent CT after delayed filling of compartments and compromised nerve root sleeves.

c. In the clinical setting of intracranial hypotension and post-surgical meningocele, dynamic real time and static x-ray myelogram images can determine if there is a spinal cerebrospinal fluid leak as the cause of debilitating postural headaches. Very often, myelographic images using high temporal resolution and or digital subtraction imaging are necessary to visualize the location of a CSF leak or fistula between the intrathecal space and the epidural space or spinal venous sinuses. These x-ray myelogram images are critical in making this diagnosis and are more important than the CT images performed afterwards, as contrast diffusion out of the intrathecal space will have obscured the defect – which is typically small.

d. In traumatic spinal injury with nerve root avulsion and pseudo-meningocele, plain radiographic myelography images are important in providing high resolution evaluation of nerve root avulsion, frequently to a more conclusive degree than CT.

e. X-ray myelography is critical to the assessment of impaired functioning of an intrathecal pain pump and catheter. As with arachnoiditis, there may be compartmentalization of contrast flow that is in apparent on subsequent CT. Post-myelogram CT, if obtained, is again complementary by better demonstrating catheter malposition, granuloma formation, and other complications.

3. In the post-surgical spine, fusion hardware causes streak artifact that can obscure multiple levels of the spinal canal and spinal column. This renders the post myelogram CT images at those levels non-diagnostic, and the radiologist and clinician are reliant on the myelography images for evaluation.

Specifically, beam-hardening artifact from pedicle screws, connecting rods, and crossbars routinely obscures the lateral recess on post-injection CT. With C-arm fluoroscopy, table-tilt capability, and the use of parallax imaging and multiple projections, these areas can be visualized myelographically. Also, posterior fusion rods typically extend above and below the
disc levels that have been fused, allowing purchase on healthier levels, and decreasing leverage and stress on a shorter hardware construct. However, secondary artifact may then obscure the very disc levels most prone to accelerated degeneration following fusion ("next-level" disease).

4. Spine surgeons typically request and utilize complex X-ray exams of their patients in multiple projections and positions (i.e., oblique, flexion, extension, lateral bending, and sitting) for pre-operative planning. When requesting myelography, surgeons expect myelographic images in similar positions for comparison and to identify areas of pathology in positions in which the patient is most symptomatic. The myelogram fluoroscopic images provide the spine surgeon with a visual overview of the spine and spinal canal not achieved with post-injection CT imaging. Some surgeons find that this fluoroscopic view alerts them more accurately to compromised regions of the central spinal canal and lateral recess that may be very small and more challenging to decompress in order to avoid neural injury.

Lastly, in the current climate of radiation dose reduction, an effort to limit a patient’s exposure to ionizing radiation has become an integral part of imaging planning and workup. Radiation dose for a CT exam is typically an order of magnitude greater than the X-ray radiation dose used during a myelogram; thus a radiologist would prefer to limit the volume of tissue exposed during a CT exam as much as possible.

In current practice, contrast opacification of adjacent segments of the spinal canal in addition to the target area of interest is unavoidable during myelography, as is inclusion of adjacent segments of the spine in the X-ray field of view. In other words, myelogram imaging of the lower thoracic spine during a lumbar myelogram is necessary to confirm inclusion of the entire lumbar area; to identify normal or anomalous segmentation; and to confirm absence of a lower thoracic pathologic process mimicking lumbar-level disease. Rather than representing examples of unnecessary radiation exposure, this represents routine practice in a thorough exam, and does not entail charging of an additional thoracic myelogram code, as per coding convention.

This typical scenario actually reduces overall radiation exposure to the patient, as the scope and extent of subsequent post-injection, higher-dose CT imaging can be diminished. For instance, confirmation of a normal-appearing lower thoracic spinal column, a normal conus, and absence of significant pathology at the upper lumbar levels on myelography can allow the radiologist to limit a subsequent CT exam to the lower lumbar levels only. Due to the significant reduction in CT coverage and radiation, this practice reduces overall radiation dose to the patient.

Similarly, if a patient presenting with thoracic back pain underwent a post-injection CT without myelography, it would be necessary to scan every millimeter of the thoracic spine, as the clinician and radiologist would not know where the pathology lies, and medicolegal concerns would demand complete coverage. However, degenerative, neoplastic, and inflammatory conditions rarely affect every level of the thoracic spine, and are frequently limited to one, two, or a few levels. A dedicated thoracic myelographic study performed prior to a CT allows targeting of the CT to the specific levels of interest.
Although multiple X-ray images may be acquired in this scenario, the overall radiation dose can be reduced, due to significant reduction in CT exposure.

Thoracic myelography will also include at least partial visualization of the adjacent segments of the cervical and lumbar spine – especially the lumbar, as the contrast injection is typically at this level. This allows confirmation of normal spine segmentation, or identification of anomalous spine segmentation, which is found in 10-20% of the population, and which is a major cause of medicolegal concern due to ‘wrong-level’ surgery. And as stated in the lumbar example above, a thoracic myelogram will allow identification of major pathology in the lower cervical levels, or in the lumbar spine, which may be mimicking thoracic-level disease.

This multi-procedure evaluation is analogous to the code combinations used for contrast-enhanced imaging evaluation of a joint, for example the shoulder – including joint injection of contrast for CT or MR imaging (CPT® code 23550); formal arthrography of a joint (73040); and MRI or CT performed post-intraarticular injection of contrast (73222). To our knowledge, no NCCI edit exists to disallow the reporting of a formal arthrogram (such as 73040) and a subsequent CT or MRI with intraarticular contrast (such as 73222). This is appropriate, because a formal arthrogram will include positioning of the joint in multiple orientations, including in a manner that may reproduce the patient’s symptoms; whereas a post-injection CT or MRI of a joint is obtained with the patient static, usually supine. Arthrography also includes a temporal component, for example to allow visualization of delayed diffusion of contrast into a labral tear or into the subacromial/subdeltoid bursa. Formal arthrographic evaluation may be deferred with only the injection code and post-injection MRI or CT reported. However, the arthrogram code is still available and appropriately reported in some situations.

In current practice, neuroradiologists, spine radiologists, and others still frequently perform a formal myelographic assessment, even when a post-injection CT of the spine is planned, for the reasons outlined above. In order to maintain this important diagnostic tool, we must emphasize that myelography has always been the initial study used for diagnosis of spinal pathology; and that CT was an added component that has allowed characterization of extrinsic structures compressing the spinal cord and nerve root (disc, bone, tumor), and also provides visualization of the foramen and far lateral regions, occult on myelography. Post-injection CT imaging and functional myelographic images are complementary exams, and are both typically necessary for complete evaluation of spinal degenerative disease pre- and post-operatively.

We appreciate the opportunity to comment on this proposed NCCI edit. Performing both a myelogram and a subsequent CT does NOT represent coding abuse or error, but reflects a pathway of common clinical practice.

References
1. James N. Weinstein, DO, MSc; Tor D. Tosteson, ScD; Jon D. Lurie, MD, MS; Anna N. A. Tosteson, ScD; Brett Hanscom, MS; Jonathan S. Skinner, PhD; William A. Abdu, MD, MS; Alan S. Hilibrand, MD; Scott D. Boden, MD; Richard A. Deyo, MD, MPH. Surgical vs Nonoperative Treatment for

Sincerely,

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