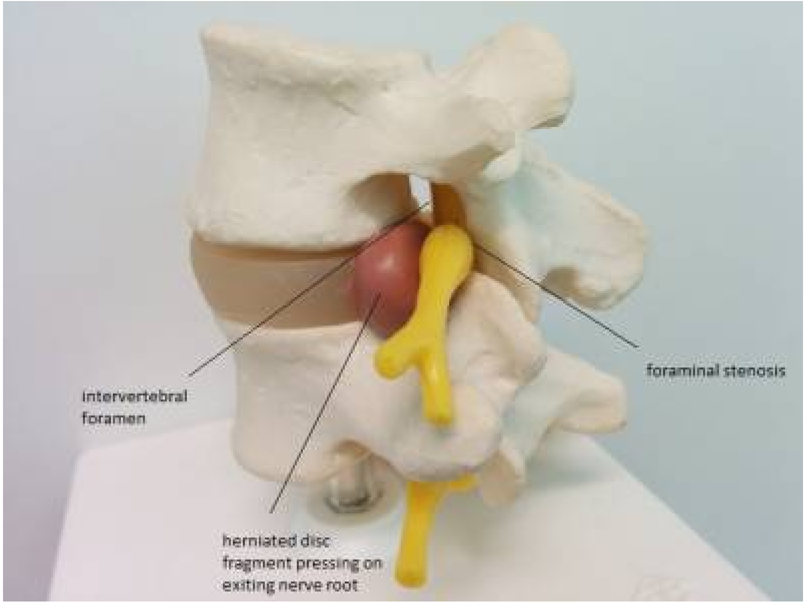
Cervical intervertebral foramen



Angulated projections are used in radiography to show the cervical neural foramen. Imaging the coronal oblique planes in an cervical spine MRI should therefore improve visualization of neural foramen pathology.

A multi-center investigation of 40 patients with monoradiculopathy and 10 healthy controls was undertaken. T2-weighted sagittal, coronal oblique and axial slices were individually and separately examined by four readers blinded to the diagnosis. The statistical evaluation compared against the clinical gold standard of the neurological diagnosis of a single nerve root irritation or lesion.

The sensitivity/specificity required to detect the relevant neural foramen pathology was 0.47/0.60 for axial, 0.57/0.90 for sagittal and 0.55/0.70 for coronal oblique scans. The readers felt significantly more confident in attributing the cause of pathology using coronal oblique planes. Interreader reliability was moderate to substantial, with the highest values for the sagittal planes (0.39-0.76) and lower values for the transversal and coronal oblique planes (0.15-0.63). Intrareader reliability was substantial, with values between 0.53 and 0.88. Reading the axial planes was significantly more time consuming than reading the other planes.

The use of coronal oblique planes in cervical spine MRIs increases sensitivity and confidence in attributing the cause of neural foramen obstruction. They are easy to interpret and demand less reading time than axial planes, and so the inclusion of coronal oblique planes in the workup of cervical spine MRI is recommended, at least when neural foramen pathology is suspected [1).

Cervical transforaminal epidural steroid injections are performed for the treatment of radicular pain. Multiple recent case reports have raised safety concerns regarding neurologic deficits such as anterior spinal artery syndrome and cerebellar injury after these injections. To investigate the potential causes of these injuries, an anatomic study was conducted. In this study of 10 embalmed cadavers, the cervical intervertebral foramina were examined to determine if the ascending or deep cervical arteries supplied radicular or segmental medullary arteries potentially susceptible to cannulation or needle trauma during transforaminal injection. In two specimens, dissection was carried down to the spinal cord, demonstrating the anterior spinal, radicular, and segmental medullary arteries. Of 95 intervertebral foramina dissected, 21 had an arterial vessel proximal to the posterior aspect of the foraminal opening. Seven of these 21 were spinal branches that entered the foramen posteriorly, potentially forming radicular or segmental medullary vessels to the spinal cord. One additional ascending cervical artery formed a segmental medullary artery that joined the anterior spinal artery. This would only be injured by anterior needle misplacement. Of the seven foraminal branches, three were included in the deep dissections. Two contributed to segmental medullary arteries and one to a radicular artery. Variable anastomoses between the vertebral and cervical arteries were found. Therefore, it is possible to introduce steroid particles into the vertebral circulation via the cervical arteries. Critical arteries are located in the posterior aspect of the intervertebral foramen and may be vulnerable to injection or injury during transforaminal epidural steroid injection [2].

1)

Freund W, Weber F, Hoepner G, Meier R, Klessinger S. Coronal oblique orientation of the neural foramen improves cervical spine MRI: A comparison of the sensitivity of different angulations. Clin Imaging. 2018 Oct 13;53:162-168. doi: 10.1016/j.clinimag.2018.10.011. [Epub ahead of print] PubMed PMID: 30343168.

2)

Huntoon MA. Anatomy of the cervical intervertebral foramina: vulnerable arteries and ischemic neurologic injuries after transforaminal epidural injections. Pain. 2005 Sep;117(1-2):104-11. PubMed PMID: 16055268.