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CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 29 year old woman has had intermittent headaches and occasional dizziness for some time. Approximately 10 days prior to her clinic visit, she developed numbness and tingling in the right lateral neck radiating down the right upper extremity. The right sided neck and arm symptoms began after an episode of jet skiing, although there was no specific trauma during this activity. Her symptoms have been persistent since then. Which of the following is the most appropriate imaging study?

(a) plain films of the skull
(b) emergent unenhanced cervical spine CT performed without contrast material
(c) magnetic resonance (MR) imaging of the cervical spine
(d) no imaging study is necessary in this situation

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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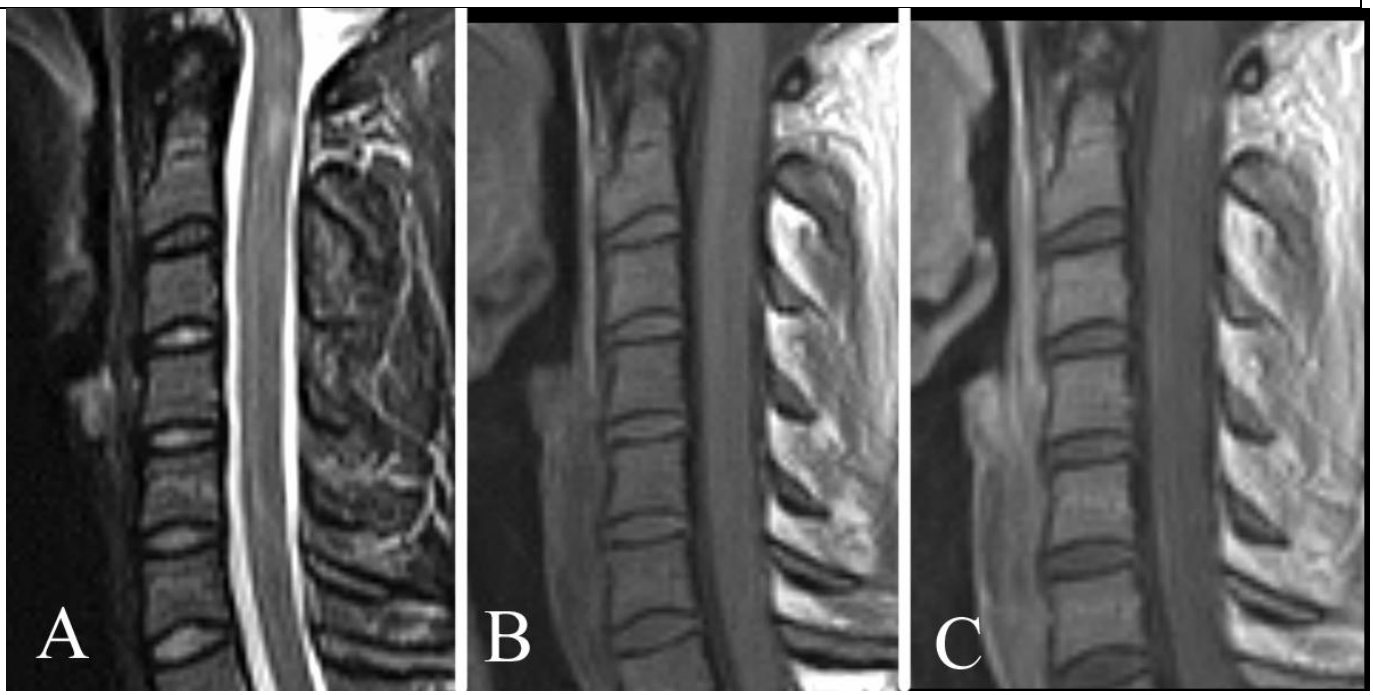
Answer: (c), magnetic resonance (MR) imaging of the cervical spine. The patient's headache and neck pain are not terribly specific and may relate to any a number of causes including degenerative changes of the cervical spine, for which MR of the spine would be an appropriate study. However, her right arm numbness and tingling are of more concern and may represent either radicular symptoms or myelopathy.

Plain films of the skull (a) offer no significant information regarding the status of the patient's brain or cervical spinal cord, and (a) is incorrect. Emergent unenhanced cervical spine CT performed without contrast material is most often obtained in the setting of significant cervical spine trauma, but it is less sensitive in the depiction of herniated discs, and CT does not demonstrate demyelinating disease of the spinal cord (at least prior to the end stages of the disease when there is gross atrophy), and (b) is incorrect. Imaging is necessary in this situation, so (d) is incorrect.

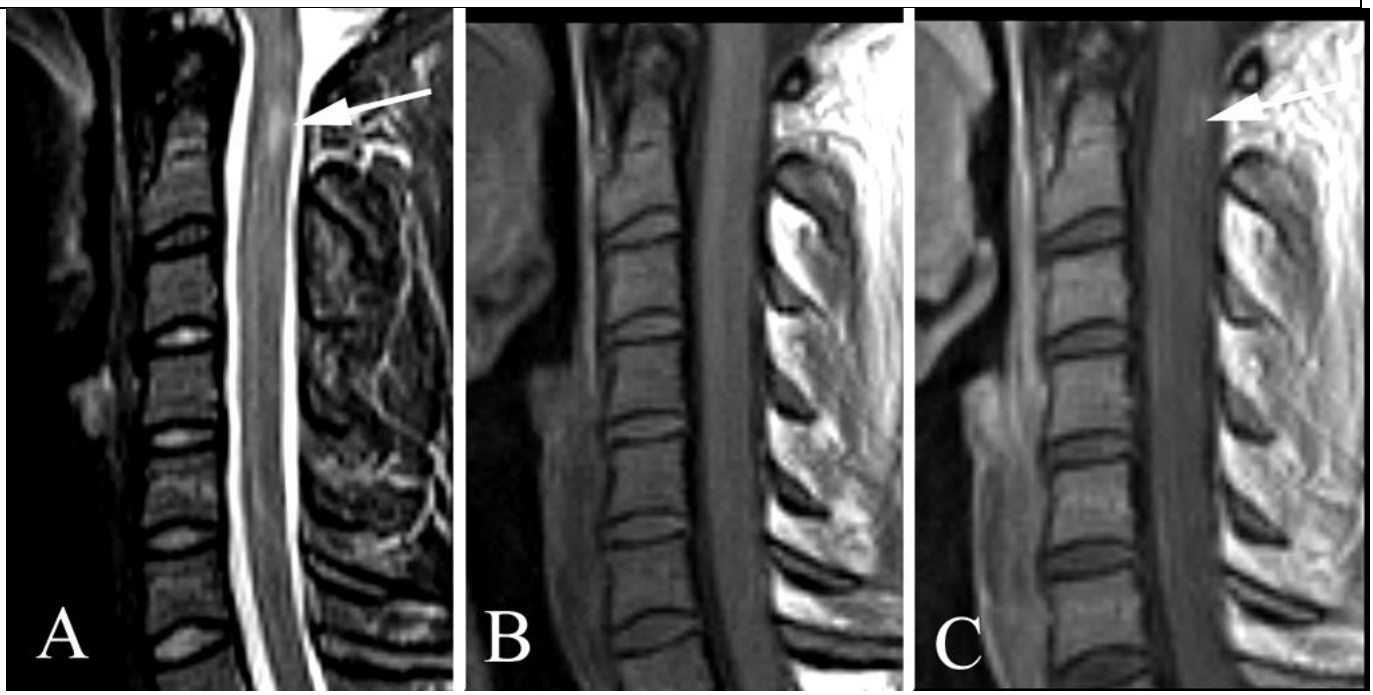
IMAGING STUDY AND QUESTIONS



Imaging questions:

1) What type of study is shown in figures A - C?
2) Are there any abnormalities on these images?
3) What is the most likely diagnosis?
4) What are the next steps in management?

IMAGING STUDY QUESTIONS AND ANSWERS



Imaging questions:

1) What type of study is shown in figures A - C? This is a cervical spine magnetic resonance examination. Figure A is a sagittal T2 weighted image, figure B is a sagittal T1 weighted image performed prior to contrast injection, and figure C is a sagittal T1 weighted image performed following contrast injection. All images have been magnified and cropped to better demonstrate the abnormal finding(s).
2) Are there any abnormalities on these images? There is focal T2 prolongation (manifesting as increased signal intensity on T2 weighted images) in the proximal cervical spinal cord in figure A (arrow). There is no abnormality in figure B. Figure C shows subtle contrast enhancement at the location of the lesion seen in figure A. Additional, less well defined increased signal is seen at about the C5 level in figure A; this may represent additional disease or normal variation of signal through this segment of the image.
3) What is the most likely diagnosis? Demyelinating disease. Multiple sclerosis needs to be considered.
4) What are the next steps in management? A brain MR examination (performed without and with contrast material) and neurologic consultation.

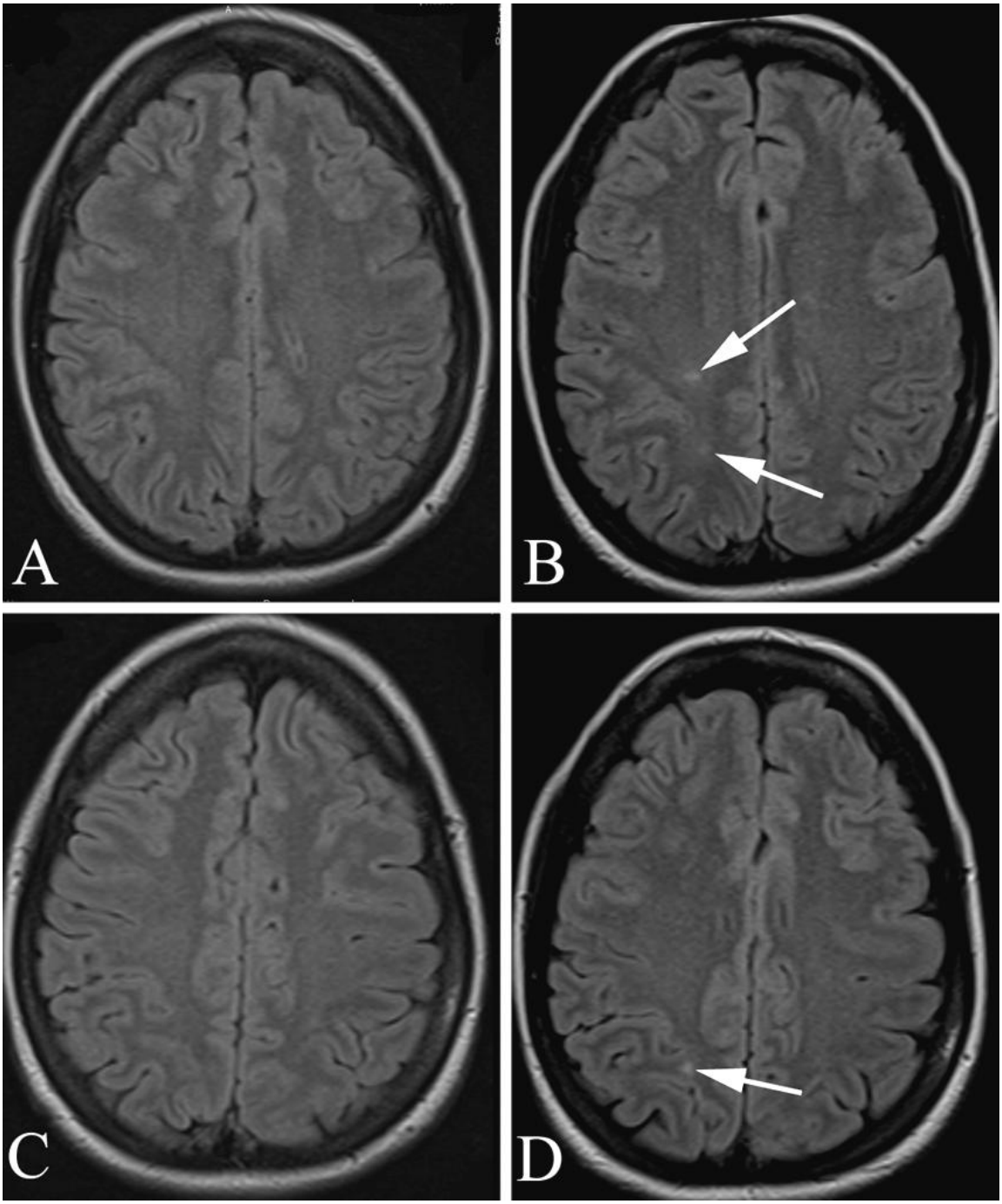
PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

A brain MR examination was performed which was normal (see below). The patient was referred to a neurologist. A detailed neurological examination found decreased sensation to pinprick of the index finger, web space, and thumb, as well as borderline decreased right grip strength. Blood was drawn and the following studies were normal or negative: HTLV I/II antibody, neuromyelitis optica autoantibody IGG, ACL screen, ANA, Lymes (non-reactive), vitamin B-12, UR immunofixation for Port-RndUr and BJ protein, Sjogren's antibody, methymel acid, and serum protein immunoelectrophroesis. CSF was drawn and showed a normal color and appearance without RBCs, with normal protein and glucose, and negative culture and gram stain. However, oligoclonal banding was positive. The patient followed up in one week and was told that her findings were consistent with multiple sclerosis, and the diagnosis was discussed at length with the patient.

Within a week, the patient sought a second opinion from another neurologist. She was told that she had transverse myelitis, and that this could represent the first manifestation of multiple sclerosis. The patient was treated with steroids, but was not given disease-modifying medication for multiple sclerosis.

The patient was seen one year later by a primary care provider in clinic for headache. Her paresthesias had resolved. She has some right trapezius discomfort as well. She had already called a neurologist who told her that he did not think her headache was secondary to demyelinating disease. A diagnosis of tension headache was made.

The patient was seen again 6 months later by a primary care provider, this time for headache but also vertigo and tinnitus. On questioning, the patient also had some tingling of the right thigh. An MR study was performed (see below) which showed new white matter lesions, indicating that the patient likely does have multiple sclerosis.



31 year old woman who initially presented with headaches and right arm numbness and tingling, then, 18 months later, headache and vertigo. A and C are two adjacent axial FLAIR brain MR sequences obtained at the time of initial presentation and are normal. B and D are corresponding adjacent axial FLAIR sequences obtained 18 months later after the onset of vertigo, and demonstrate new white matter FLAIR hyperintensities (arrows) compatible with demyelinating disease.

SUMMARY

Presenting symptom: Neurologic symptoms generally need to be placed in one of several categories to plan imaging. In this case, the patient had intermittent neurologic symptoms which suggested possible demyelinating disease. There are, of course, multiple other causes of such nonspecific neurologic symptoms, and many times no specific cause is found.

Imaging work-up: MR is typically obtained when MS is the suspected diagnosis. In this case, a cervical spine MR examination showed findings suspicious for demyelinating disease and a brain MR was immediately recommended and obtained, but was normal. Therefore, the patient most likely had (as of the time of the initial work-up) either transverse myelitis or multiple sclerosis presenting as an isolated cord lesion (an unusual scenario).

Establishing the diagnosis: The McDonald criteria are typically used for diagnosis of multiple sclerosis. To meet the McDonald criteria, the patient should have had one clinical attack (e.g., transient sensory or motor deficit, visual loss from optic neuritis, diplopia, or balance problems/vertigo) and either abnormal cerebrospinal fluid protein (oligoclonal bands) or a characteristically abnormal MRI. The MRI, to be characteristically abnormal, must show at least three out of the following four MRI abnormalities: one gadolinium enhancing or nine T2-hyperintense lesions (if no gadolinium enhancing lesion is seen); one or more infratentorial lesions; one or more juxtacortical lesions; and three or more periventricular lesions.

Take-home message: Intermittent neurologic deficits, especially in a clinical setting where multiple sclerosis is a possible diagnosis, should be evaluated with magnetic resonance imaging.

FURTHER READING

Eisen A. Disorders affecting the spinal cord. UpToDate, accessed 2/7/11.

McDonald WI, Compston A, Edan G et al. Recommended diagnostic criteria for multiple sclerosis: guidelines from International Panel on the diagnosis of multiple sclerosis. Ann Neurol; 2001:50:121-127.

Olek MJ. Diagnosis of multiple sclerosis in adults. UpToDate, accessed 10/26/09.

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