CMRS Spring 2009 Vision Challenge Solution

Case 15

History:
45-year-old male with foot drop

Exam:
MRI of the right knee and proximal leg, with and without contrast

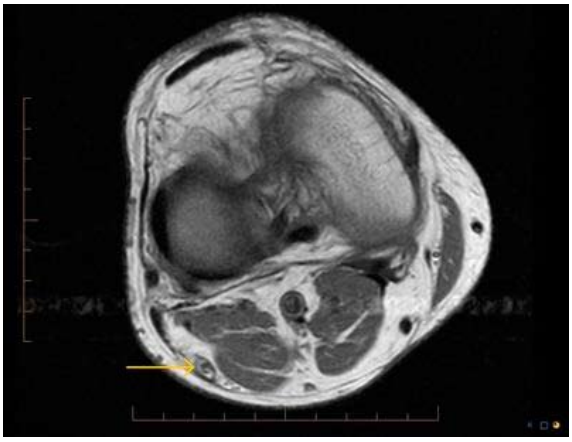

Fig 1: Axial T1 weighted image demonstrates a normal common peroneal nerve superior to the knee joint.

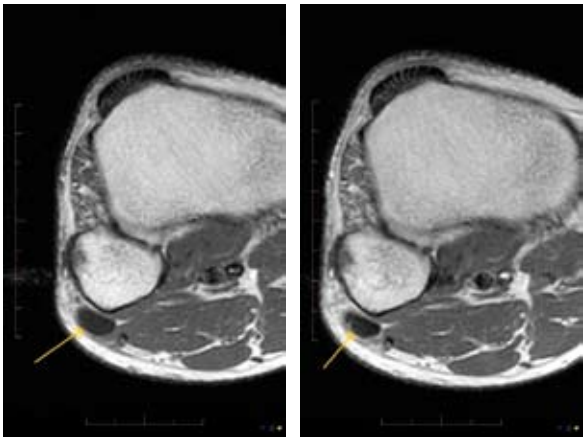

Fig 2 and 3: Axial T1 pre and post contrast images, at the level of the tibiofibular joint, demonstrates that the common peroneal nerve is distended with low signal, and does not centrally enhance.

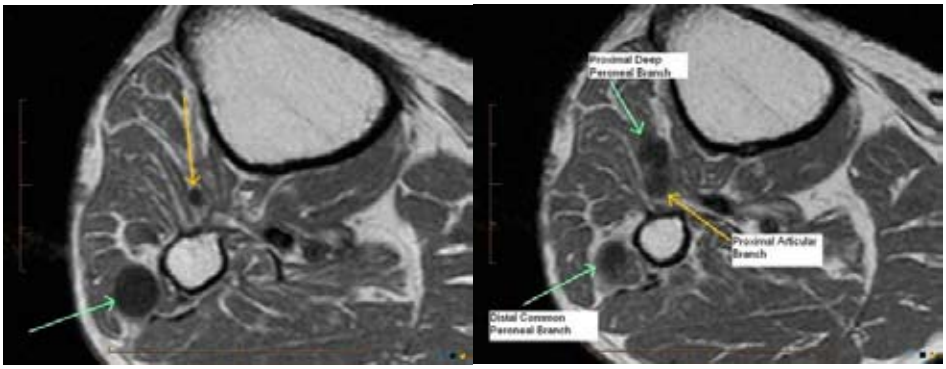

Fig 4, 5, and 6: Axial T1 precontrast images and a Sagital STIR image, further defines the extent of this abnormality which extends into the proximal deep peroneal nerve. Additionally, the articular branch of the peroneal nerve is distended.

Fig 7: Coronal T2 image show a small connection or "stalk" from the superior tibiofibular joint to the articular nerve branch.

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Findings: A normal common peroneal nerve can be seen superior to the knee joint (image 1, axial T1). At the level of the tibiofibular joint, the common peroneal nerve is distended with low signal, and does not enhance (images 2 and 3, axial T1 pre- and post- contrast).

Following the nerve inferiorly shows the extent of this abnormality along the common peroneal nerve and into the proximal deep peroneal nerve (images 4 and 5, axial T1 and image 6, sagittal STIR green arrows). Additionally, the articular branch of the peroneal nerve is distended (images 4 and 5, yellow arrow) and a small connection or "stalk" from the superior tibiofibular joint to the articular branch can be appreciated (image 7, coronal T2).

Diagnosis: Spinner Classification Stage III intraneural ganglion of the peroneal nerve

Discussion: *Intraneural ganglion cysts* are mucinous cysts forming within the epineurium of peripheral nerves. This rare occurrence most commonly involves the peroneal nerve. Much of our understanding of the pathogenesis, staging, and history of intraneural ganglia comes from the work of Dr. Robert Spinner at the Mayo Clinic. His "unifying articular theory" stipulates that tibiofibular ganglion cysts, both extra and intraneural, originate from the superior tibofibular joint, and that in the intraneural variety a connection to the articular branch of the peroneal nerve serves as a conduit for fluid to extend, along a path of least resistance, into the deep peroneal nerve, the common peroneal nerve, and even the sciatic nerve.

Patients with peroneal intraneural ganglion cysts share a common clinical presentation and progression of symptoms, referable to the degree of involvement of the deep peroneal nerve. The initial symptom is poorly localized leg pain, which progresses to neuropathic pain in the DPN distribution, then to foot drop secondary to weakness of the tibialis anterior muscle.

Staging of tibiofibular ganglia can be accomplished with MRI.

Extraneural cysts from the superior tibiofibular joint are classified as Stage 0. *Intraneural* cysts are staged according to their predictable progression from the articular nerve (Stage I), to the proximal deep peroneal nerve (Stage II), the common peroneal nerve (Stage III), and finally the sciatic nerve (Stage IV).

Treatment is aimed at intraneural cyst decompression and elimination of the pathway of fluid extension from the joint into the deep peroneal nerve. The latter can beaccomplished via ligature of the supplying articular nerve branch or by synovectomy of the superior tibiofibular joint. Recurrences were common in early treatment of IGCs;however, these predictably occurred when elimination of articular nerve supply to the ganglion cyst was not accomplished, either when treated with simple nerve aspirationor decompression with non-identification and/or eradication of the articular branch.

References:

1. Spinner RJ, Atkinson JLD , Tiel RL. "Peroneal intraneural ganglia: the importance of the articular branch: A unifying theory." *J. Neurosurg..* Vol. 99, August 2003; 330-343. 2. Stoller D, Li A, Anderson L, Cannon WD. "Tibiofibular Joint Arthrosis and Ganglia." *Magnetic Resonance Imaging in Orthopaedics and Sports Medicine.* Baltimore: Lippincott, Williams, and Wilkins, 2007; 666; 671-672.