Peroneal Nerve Palsy Due to an Intraneural Ganglion: A Case Report of a 4½-Year-Old Boy

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Intraneural ganglion cysts are rare, especially in the pediatric population. Most patients are male and present at a mean age of 34.[1,2] These benign masses commonly occur in the peroneal nerve[1-10] but have also been reported in the ulnar nerve,[3,11-13] the posterior interosseous nerve,[14] the median nerve,[15] and the brachial plexus.[16] Patients typically present with pain and motor deficit. Resolution of these symptoms has been documented with surgical removal of the cyst.[1,4,5,9,13]

We report a case of a peroneal nerve palsy caused by an intraneural ganglion in a 4½-year-old boy.

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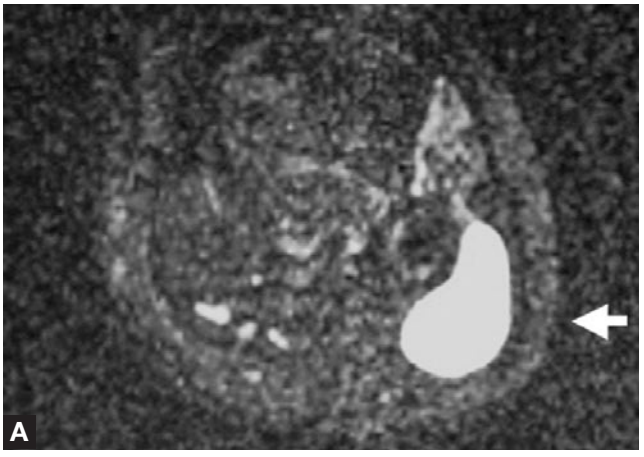
Case Report

A healthy 4½-year-old boy presented to our office with an intermittent limp over the past 10 months. His mother noted a soft-tissue mass in the posterolateral aspect of the left knee that had enlarged and become more painful over the past few months. The family did not report any trauma to the knee. The child had no history of systemic infection. On examination, the child had a firm, mobile soft-tissue mass located behind the neck of his left fibula. The mass was tender to palpation. He had painless range of motion of the knee. He demonstrated a steppage gait. Neurological examination demonstrated a left foot drop. No active dorsiflexion at the ankle or great toe could be appreciated. His reflexes were normal. A sensory examination could not be adequately performed.

Plain films of the left knee did not show any bony or soft-tissue abnormalities. The T_2-weighted magnetic resonance image (MRI) showed a 2 × 1.8 × 2.5-cm cystic mass posterolateral to the fibular head without abnormal enhancement. The sagittal T_1-weighted image with fat saturation following contrast demonstrated the shape and location of the cystic mass. No connection was found between the cyst and the knee or tibiofibular joint. No bony attachment or involvement of the adjacent soft tissue could be appreciated. The location and characteristics of the cyst suggested that the cyst was originating from the soft tissues of the peroneal nerve or from within the nerve itself



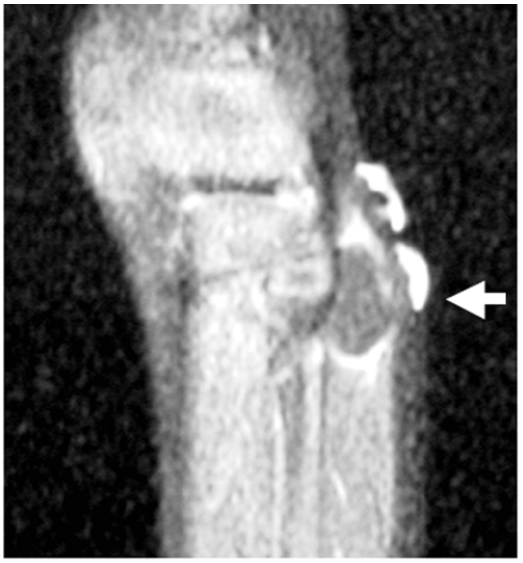


Figure 1. (A) An axial T_2-weighted magnetic resonance image demonstrates a cystic mass adjacent to the posterior and lateral aspects of the fibular neck (arrow). (B) A sagittal T_1-weighted magnetic resonance image with fat saturation following contrast shows a cystic mass at the level of the fibular neck (arrow).

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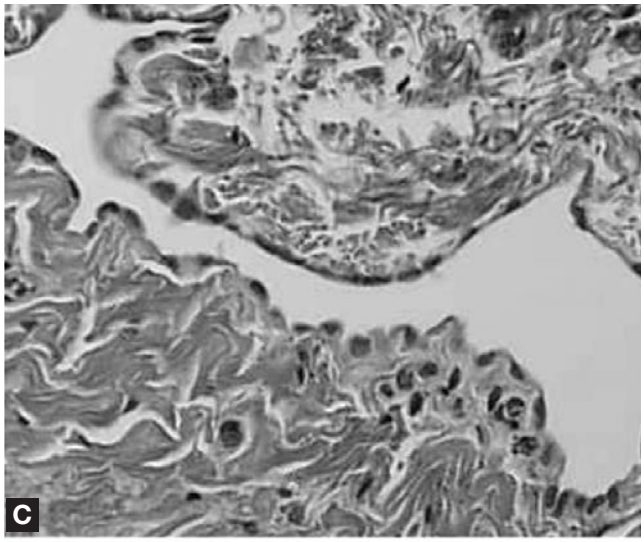

Figure 2. Pathological specimen of the intraneural ganglion demonstrates a fibrous wall that is lined by cuboidal synovial cells (hematoxylin and eosin, original magnification x 50).

(Figure 1). Electrodiagnostic studies were not performed because of the clear clinical picture.

After informed consent was obtained, the patient underwent an open exploration of the peroneal nerve. The nerve was identified through a lateral approach to the knee. A fusiform cystic enlargement was contained within its sheath. The nerve was traced distally, exposing normal tissue. An intraoperative nerve stimulator showed no motor nerve function distally. The nerve sheath was opened longitudinally, and a gelatinous clear fluid was easily separated from the nerve fibers. The fluid was evacuated, and part of the neural sheath was removed. The nerve fascicles were found to be flattened and separated from each other. Further decompression was done by releasing the muscle and fascia of the tibialis anterior near its origin. The pathological specimen revealed a benign cyst with a fibrous wall that was lined by cuboidal synovial cells (Figure 2).

An electromyogram was performed at 2 months following excision of the cyst. The electromyogram demonstrated an isolated involvement of the common peroneal nerve with sparing of the posterior tibial nerve. The study showed that the integrity of the nerve was preserved, although there was a 63% reduction in the amplitude compared with the opposite site.

The patient had full motor recovery of peroneal nerve $4^1/_2$ months after the surgery. He is currently asymptomatic and has returned to full activities. At 14 months' follow-up, he has no recurrence of the cyst.

Discussion

The cause of the intraneural ganglion cyst is unclear. Some authors suggest that the cyst originates from the tibiofibular joint and enters the peroneal nerve through the small recurrent articular branch.[7,10] Alternatively, the ganglion may originate within the nerve itself. Gurdjian and colleagues[12] believe that the ganglion develops following reabsorption of an intraneural hemorrhage. It is also thought that perineural connective tissue can undergo mucinous degeneration or metaplasia to form a ganglion.[4] Based on electron microscopy findings, Scherman and colleagues[2] concluded that myofibroblasts, similar to those in wrist ganglia, invade the nerve sheath. The nerve palsy can be caused by stretching of the nerve or by posterior elevation. The nerve can be compressed against the fibular neck and the peroneus longus, causing neurological deficit.[10]

Presenting Signs and Symptoms. Patients with intraneural ganglions typically present with motor dysfunction and pain. Foot drop is a common finding in patients with peroneal nerve involvement.[1,5,8,9] Chick and colleagues[3] reported on a series of 10 patients with involvement of the peroneal or ulnar nerves. All had motor deficits, and 6 had sensory deficits. On physical examination, only 3 had a positive Tinel's sign.

Diagnostic Considerations. The differential diagnosis of a patient presenting with a foot drop includes schwannoma, neurofibroma, ganglion cyst, mononeuritis, and idiopathic peroneal palsy. Radiographic work-up includes ultrasound, computed tomography, and MRI. On ultrasound examination the cyst is anechoic and well circumscribed. The ultrasound is a readily available, harmless imaging modality that can be used to evaluate a patient with a foot drop.[6] A computed tomography scan further defines the intrinsic properties of the lesion and its relationship to the surrounding bone, muscle, and nerves.[1,6] MRI demonstrates homogenous low signal intensity on T_1-weighted images and high signal intensity on T_2-weighted images along the course of the involved nerve. A connection between the cyst and the nearby joint can be seen on MRI.[13] Electrodiagnostic studies are most useful in determining the extent or magnitude of the lesion.[8] Electromyography can show complete degeneration of the nerve without response to stimulation.[4]

Treatment. Cobb and Moeil[4] recommend surgery when a foot drop persists beyond 3 months and in the presence of swelling or pain in the nerve at the level of the fibular neck. Excision of the cyst is the treatment of choice. Part of the neural sheath should be removed in order to lower the chance of recurrence. Aspiration of the cyst is inadequate, has a high recurrence rate, and also can lead to injury of the nerve or surrounding tissues.[5] The cyst itself can involve as much as 15 cm of the nerve.[6] Nerve resection and grafting are discouraged even in the case of extensive lesion.[3]

Recovery and Recurrence. The average time to neurological recovery is 10.75 months,[9] but in this reported case, the patient had full recovery in $4^1/_2$ months after surgery. Recurrence is rare but has been reported to be as high as 30%.[3,4] Reexploration of a recurrence cyst can lead to a successful outcome.[6] A posterior tibialis tendon transfer can be used as a salvage procedure.[8]

The youngest person reported to have an intraneural ganglion cyst of the common peroneal nerve was a 4-year-old boy. This child presented with a 2-month history of a progressive foot drop and a firm mass palpated over the

fibular neck. The child regained full ankle and toe motion at 6 months after removal of the cyst.[9] Another boy who was 12 years old at presentation required sacrifice of 40% of the peroneal nerve fascicles in the process of removing the cyst. His pain subsided, but he did not regain foot dorsiflexion.[7]

Conclusions

This case report demonstrates an unusual pathological condition in the peroneal nerve correlating with the patient's physical findings and is evidence that it can occur in a child as young as $4^1/_2$ years of age. Our patient is the second reported case in the literature of a peroneal nerve ganglion cyst in this age group. This type of cyst should be considered in the differential diagnosis of a child with a peroneal nerve palsy associated with posterolateral knee swelling. Early diagnosis can lead to complete recovery, as illustrated in this case.

Author's Disclosure Statement and Acknowledgements

The authors report no actual or potential conflicts of interest in relation to this article.

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