Intraneural Ganglia of the Common Peroneal Nerve in Children: Case Report and Review of the Literature

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Key words
- Children
- Cyst
- Intraneural ganglia
- Peroneal nerve
- Surgery

Abbreviations and Acronyms
CPN: Common peroneal nerve
DPN: Deep peroneal nerve
EHL: Extensor hallucis longus muscle
EMG: Electromyography
IG: Intraneural ganglia
MR: Magnetic resonance
NCS: Nerve conduction studies
PM: Peroneal muscles
PN: Peroneal nerve
TA: Tibialis anterior muscle
TF: Tibiofibular
US: Ultrasound

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OBJECTIVES: **Intraneural ganglia are nonneoplastic cystic formations contained within the epineurium of peripheral nerves. The common peroneal nerve at the fibular neck is the most frequently affected site. Intraneural ganglia are not a frequent occurrence in the adult patients and are even rarer in children, with only 10 pediatric cases reported in the English language literature. We report on a new pediatric case of intraneural ganglion of common peroneal nerve and present a review of the English language literature on this topic in children.**

METHODS: **A 10-year-old girl was admitted to our institution because of pain referred to posterior and anterior aspects of the right leg and right foot drop. The radiologic investigations showed a wide (20 cm long) intraneural ganglion cyst of the right common peroneal nerve. The patient underwent surgical treatment according to the Spinner technique.**

RESULTS: **Postoperative course was uneventful. A gradual improvement of motor and sensory functions was observed, starting from the third postoperative day, with a complete motor function restoration registered 26 months after surgery.**

CONCLUSIONS: **Intraneural ganglia of the common peroneal nerve should always be considered in the differential diagnosis of foot drop in pediatric age since because early diagnosis and adequate surgical treatment play a crucial role in the patient's motor and sensory outcomes.**

INTRODUCTION

Intraneural ganglia (IG) are non-neoplastic, fluid-filled cystic formations contained within the epineurium of peripheral nerves. Although many peripheral nerves may be affected, the common peroneal nerve (CPN) at the fibular neck is by far the most frequently affected site.[1-8]

The pathogenesis of IG remained a controversial issue for a long time in the past, until a "unifying articular" or "synovial" theory was proposed by Spinner and colleagues.[3,7,9]

According to their theory, the formation of IG in peroneal nerve is a dynamic process starting in a degenerating superior tibiofibular (TF) joint and subsequently extending to the nerve along its articular branch intraepineurally via a path of least resistance determined by pressure fluxes.

IG of the CPN are not a frequent occurrence in the adult population, prevailing in adult males, with a reported mean age of 34. They are even rarer in children.[10-12] To our knowledge, only 10 pediatric cases of IG of the CPN have been reported in the English language literature.[10,12-19] We report on a new pediatric case of intraneural ganglion of the CPN and present a review of the literature on this topic in pediatric age.

CASE REPORT

History

A 10-year-old girl was admitted to our observation on 13 July, 2008. Her clinical history began in April 2008. Immediately after a 2-hour flight, the patient complained of pain in the posterior aspect of the right leg, extending to the anterior aspect and associated with slapping gait. She did not play any sport. No history of previous knee trauma was reported. The pain was reported as continuous, responding to nonsteroid anti-inflammatory drugs, and worsening in the supine position. It disappeared gradually in a few days, while the neurologic deficit persisted unchanged. The girl was examined by her family pediatrician and underwent diagnostic work-up at another institution, consisting of ultrasound (US) examination, magnetic resonance (MR) of the right lower limb, and electrophysiologic studies. On the first nerve conduction studies (NCS), made 3 weeks after the onset of symptoms, the right peroneal nerve motor study showed a decrease in amplitude of compound motor action potential (MAP) and in motor conduction velocity (MCV). It was confirmed by a second electrophysiologic evaluation, made 1 month later. The needle electromyography (EMG) study of the right anterior tibial muscle showed fibrillation

potentials (grade +1), motor unit action potentials of normal amplitude and duration but with irregular morphology, and a marked reduction of recruitment.

There was electrophysiologic evidence of a subacute right common peroneal neuropathy.

MR and US examination suggested the presence of a CPN tumor. Thus the patient was referred to our institution for diagnostic and therapeutic management.

Examinations

Neurologic examination revealed paralysis of dorsiflexion, eversion of right foot, and extension of right toes (grade 0/5 of muscle strength of tibialis anterior [TA], extensor hallucis longus [EHL], and peroneal muscles [PM]), resulting in foot drop and characteristic slapping gait. Moreover, sensory loss extending to the anterolateral surface of the lower leg and the dorsum of foot and toes was observed.

MR performed at the other institution was considered useless due to patient movement artifacts. It was therefore repeated at our hospital, showing a wide (20-cm long) intraneural ganglion cyst of the right CPN (see Figures 1, A–D and 2, A for further explanations).

The decision to perform surgical treatment of the ganglion cyst was made.

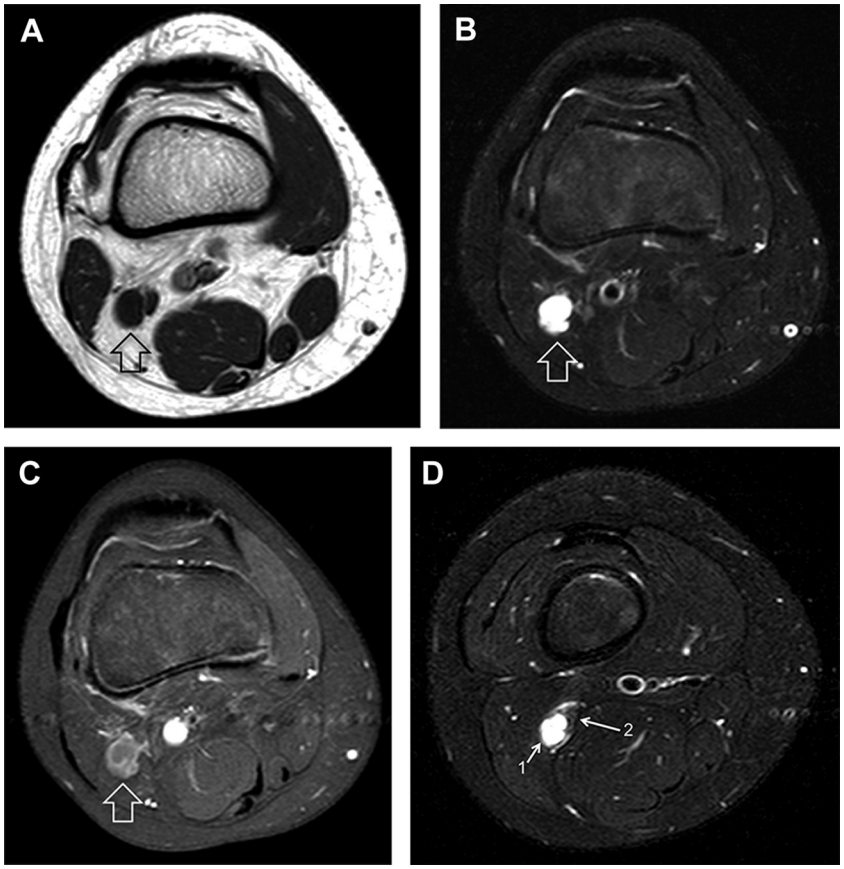

Figure 1. Preoperative magnetic resonance imaging (MRI) examination of the right knee using (**A**) T1-weighted, (**B**) fat-suppressed T2-weighted, and (**C**) gadolinium-enhanced T1-weighted sequences. They demonstrate a swollen, fluid-filled common peroneal nerve (*arrow*) reflecting intraneural involvement by a large ganglion cyst that expands cranially within the nerve substance from the level of the superior tibiofibular joint. Transverse, fat-suppressed tSE-T2w MRI of the distal thigh (**D**) reveals the intraneural ganglion of the peroneal nerve reaching the sciatic bifurcation. The cyst (*1*) entered the sciatic tracking the fascicles of the peroneal nerve. The tibial nerve and tibial component (*2*) of the sciatic bifurcation were totally unaffected. The longitudinal extension of the cyst in the sciatic was approximately 8 cm without cross-over paths.

Operation

The patient underwent surgical treatment on 25 July, 2008. With the patient in the left lateral decubitus position, an enlarged CPN was exposed through a curved incision over the posterolateral aspect of the proximal leg, extending from the popliteal crease posteriorly, the fibular neck laterally, and then distally as far as the anterior compartment. Under loupe magnification and after opening of the peroneus longus muscle (PL) fascia, the CPN articular branch, deep peroneal nerve (DPN), and superficial peroneal nerve (SPN) were identified and mobilized. Next, the CPN articular branch was completely dissected and exposed up to the superior TF joint. The articular branch was completely enlarged along its course. Once cyst dissection was completed (Figure 3, A), the following surgical steps were performed as described by Spinner et al.[7]: 1) resection of the superior TF joint (when the capsule was penetrated, cyst fluid was seen; Figure 3, B); 2) disconnection of the articular branch from the superior TF joint by means of ligation and transection with preservation of the branch innervating the TA (Figure 3, C); 3) cyst decompression by means of limited longitudinal epineurotomy, performed away from the CPN fascicles previously identified intraoperatively with nerve stimulation. Abundant gelatinous material, released under some pressure, was evacuated (Figure 3, D).

Finally, hemostasis was carried out and the wound was closed in anatomic layers with a subcuticular suture.

Postoperative Course

Postoperative course was uneventful. Three days postoperatively, some motor function was observed (right big toe extension: grade 1/5 of muscle strength). Physical therapy was started 2 weeks postoperatively. Postoperative MR was performed 3 months after surgery (see Figure 2, B). Four months after surgery, significant improvement of muscle strength (grade 3/5) of TA, EHL, and PM was observed. Moreover, concerning the sensory function, the light touch was restored. Seven months after surgery, further motor improvement of all previously mentioned muscles was observed (grade 4-/5 of