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Case Report

Intraneural ganglion of the intermediate dorsal cutaneous nerve of the foot: a Pollyannaish diagnostic challenge

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ABSTRACT

Intraneural ganglion cysts are rare, benign mucinous lesions that develop within the epineurium or perineurium of peripheral nerves, most commonly in proximity to synovial joints. Their occurrence in the intermediate dorsal cutaneous nerve of the foot is exceptionally uncommon. Owing to their rarity and nonspecific clinical presentation, these lesions are frequently misdiagnosed, resulting in delays in appropriate management. This report presents a case of an intraneural ganglion cyst arising from the intermediate dorsal cutaneous nerve on the dorsum of the foot. The purpose of this study is to highlight the diagnostic challenges associated with this unusual entity and to emphasize the importance of considering nerve-related pathologies in patients presenting with persistent dorsal foot masses. Initially, the lesion was presumed to be a benign and innocuous condition-a "Pollyannaish diagnosis" - which contributed to delayed recognition of the underlying neural origin. A comprehensive diagnostic approach, including detailed clinical evaluation and imaging studies, was employed to establish the diagnosis. Surgical exploration and excision were subsequently performed with careful preservation of the involved nerve and assessment of potential joint connections. This case underscores the importance of maintaining a high index of suspicion for intraneural ganglion cysts in atypical locations, utilizing appropriate imaging modalities for accurate diagnosis, and undertaking meticulous surgical management. Early recognition and treatment can improve outcomes and reduce the risk of recurrence or neurological complications.

Keywords: Intraneural ganglion, Intermediate dorsal cutaneous nerve, Dorsum of foot, Peripheral nerve cyst, Articular theory, Diagnostic dilemma, Pollyannaish diagnosis

INTRODUCTION

Intraneural ganglion cysts are fluid-filled sacs that grow along nerves.[1] It is commonly believed that these sacs develop from nearby joints, through small nerve branches, allowing fluid to enter the nerve. These cysts are most frequently found in the peroneal nerve near the knee, but they are very rare in smaller, more distant nerves such as the intermediate dorsal cutaneous nerve.[2] Intraneural ganglion represent a joint related process occurring at the entry point of the nerves through the joint capsule.

Its occurrence on sural nerve or superficial peroneal nerve or its distal branches like the intermediate dorsal cutaneous nerve of foot is very uncommon and only a handful of cases have been reported in literature currently.

These are commonly associated to internal joint derangements that are either degenerative or traumatic in origin. It can be secondary to traumatic tear of the capsule of the underlying joint which is missed on magnetic resonance imaging (MRI) owing to its minuteness. Seldomly this can also communicate with the joint. Intra-neural ganglion cyst arises when synovial fluid from joint flows into the epineural sheath of the articulate branch of

peripheral nerve and further along the path of least resistance- “unifying articular theory”.[2]

Intrarticular pressure determines the architecture of ganglion cyst and often connection with the joint is tiny and difficult to access.[3,4]

In our case a communication between the ganglion and joint capsule couldn’t be accessed, however it could have been caused due to damage to articulate cartilage of posterior sub-talar joint as the patient had history of previous trauma to the same region in discussion.

Cases of intraneural ganglion cyst arising from a capsular tear at the level of articulate branches of the intermediate dorsal cutaneous nerve have been reported in the past, further strengthening our diagnosis. Patients may experience a small lump, pain, numbness, or tingling on the dorsal aspect of foot. These symptoms are similar to those of other less serious conditions, such as ganglion cysts (not involving nerves), lipomas, or skin cysts. The term "Pollyannaish diagnosis" refers to a situation where a simple, harmless diagnosis is assumed too quickly, potentially preventing further testing for nerve-related conditions.

CASE REPORT

A 44-year-old man presented with a slowly growing swelling on the dorsum of his left foot (Figure 1) that had been in-creasing in size for over a year, accompanied by occasional pain and tingling that radiated to his second and third toes.

Figure 1: Swelling over left foot dorsal aspect of the patient.

He had a history of injury in the same region 25 years ago. His symptoms worsened with wearing hard shoes and pro-longed standing. During the physical examination, a single, globular, well-defined, firm, slightly tender lump about 2.5 cm wide and 1.5 cm tall was present on the dorsum of the foot, on the lateral aspect. The lump was mobile sideways, along the horizontal axis but not along the vertical axis. Tapping the area lead to tingling (Tinel's sign) sensation over the toes.[5,6] There was a faded scar from a previous stitch, but no other skin changes over the swelling, were noted.

Investigations

MRI revealed a tubular, fluid-filled area along the intermediate dorsal cutaneous nerve.

Below are the MRI images (Figures 2-4) of ganglionic cyst in intermediate dorsal cutaneous nerve of foot.

Figure 2: T1 weighted image of intraneuronal ganglion.

Figure 3: T2 weighted image of intraneuronal ganglion pointed on the lateral aspect of foot with a yellow arrow.

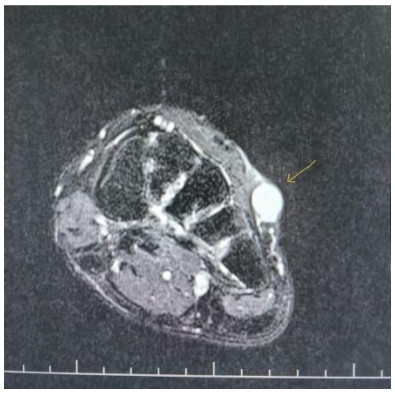

Figure 4: Transverse section of magnetic resonance imaging of foot showing the ganglion on lateral aspect in the intermediate dorsal cutaneous nerve.

Differential diagnosis

Extraneural ganglion cyst, Schwannoma, neurofibroma, lipoma, and epidermal inclusion cyst.

Management

The patient underwent surgery under regional anaesthesia.[7]

During the procedure, a fluid-filled sac (Figure 5) was found within the nerve's covering.

Figure 5: Cystic swelling over the dorsum of foot.

The nerve was carefully opened, over the perineurium, under magnification and the thick gel like fluid filled sac was dissected free from the surrounding nerve fibers. The sac wall (Figure 6) was gently separated from surrounding nerve fibers. The sac was removed completely and was found to contain gel like fluid which was send for hisopathological analysis.

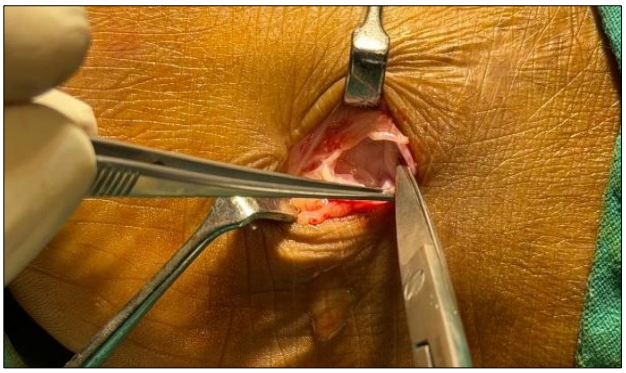

Figure 6: Wall of the cystic swelling.

A small nerve branch/fasicle, was found to be attached to the nerve fibers, which was dissected free by Racz method of neurolysis, during which one of the fasicle was minimally traumatized.

Identification and complete removal under magnification, preserving the surrounding nerve fibers, lowers the risk of recurrence.

The main nerve was preserved along with its functions.

Histopathological findings

The tissue sample showed a fluid-filled sac with a fibrous wall, no skin lining, and mucous-like fluid, all features con-sistent with an intraneural ganglion (Figure 7).

No cancerous cells were detected.[8,9]

Outcome and follow-up

Post-surgery, the patient recovered smoothly.

He experienced less pain and tingling/parasthesia, although minimal tingling persisted for a few weeks on touching the operated area which gradually improved with time.

After a six-months of diligent follow-up, there were no signs of recurrence, and his sensation was regained near normalcy in the operated area.

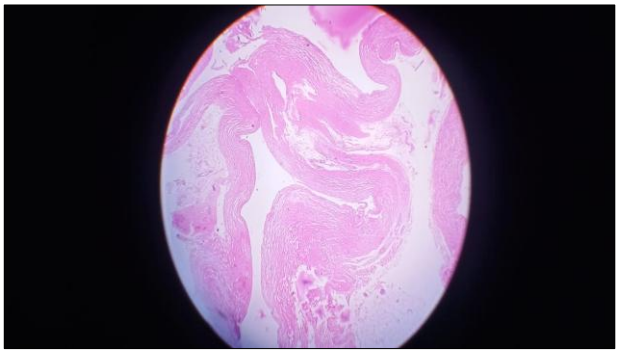

Figure 7: Histopathology of the ganglionic cyst.

DISCUSSION

Intraneural ganglion cysts in the smaller nerves of the foot are uncommon and often overlooked.[1,10]

The theory linking these cysts to joints helps explain their formation and highlights the importance of identifying and removing the small nerve branch that connects to the joint to prevent recurrence.[11] If the nerve origin is not recognised, the treatment may be incomplete. Understanding nerve anatomy is crucial for surgeons to make accurate decisions during surgery and protect the nerves.

The "Pollyannaish diagnosis" in this case refers to the initial assumption that a simple, harmless condition was responsible for the symptoms, which delayed more detailed investigations and specialist care. The swelling was initially misdiagnosed as a ganglion cyst arising from the tendon.

However, a careful physical examination, especially if Tinel's sign is positive, should prompt consideration of nerve-related issues.[12,14] MRI is the most effective imaging method to visualise these cysts, revealing their shape, position within the nerve, and potential connection to a joint. Ultrasonography (USG) guided aspiration of the ganglion cyst is an uncommon modality of treatment with higher recurrence rate. Surgery that includes nerve decompression and removal of the joint-connected nerve branch results in the best outcomes and a lower risk of recurrence.[15,16]

CONCLUSION

This case demonstrates a rare intraneural ganglion affecting the intermediate dorsal cutaneous nerve. It underscores the need for increased awareness and caution in the diagnostic process, avoiding overly optimistic assumptions. Accurate identification and appropriate surgical treatment, including addressing the joint connection, are essential for optimal outcomes.

Recommendations

Clinicians should consider intraneural ganglion cyst in the differential diagnosis of persistant dorsal foot swellings associated with neuropathic symptoms. Magnetic resonance imaging should be performed when nerve involvement is suspected. Early surgical exploration with identification and treatment of any articulate connection may reduce recurrence and improve neurological outcomes. These cases should be preferably operated under magnification to preserve nerve fibers as much as possible. Additional case reports and larger studies are needed to better define the optimal management of these rare lesions.

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