Case Report

Intraneural Ganglion Cyst Causing Peroneal Nerve Paralysis

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Summary

Intraneural ganglion is a rare cause of peroneal nerve paralysis. Pathophysiology of its origination and how it forms are still poorly understood. Pathologic processes in proximal tibiofibular joint and articular branch of peroneal nerve are thought to play a role in the development of the cyst. In this article, a peroneal nerve paralysis due to an intraneural ganglion patient is presented and important points in preoperative evaluation, and in surgery are emphasized. Cyst decompression and excision was performed to the patient. For preventing recurrence, articular stalk of the cyst and tibiofibular connection were removed. We did not see a recurrence in the second year follow up and foot drop was healed. In the differential diagnosis of the peroneal nerve paralysis, intraneural ganglion cyst should be thought.

Key words: Intraneural ganglion; peroneal nerve paralysis; proximal tibiofibular joint; articular branch

INTRODUCTION

Ganglion cyst has small part in the aetiologies of peroneal nerve paralysis. The sources of cysts are controversial. Despite some authors accept that, it is an extension along the nerve of a ganglion originating from the proximal tibiofibular joint¹⁰, there are those who argue that, it originates from the nerve through its own purely¹¹,⁷.

In situations, where peroneal nerve remained under pressure, the complaints
such as pain, sensory loss and foot drop are the symptoms expected to be seen. It is necessary to be careful in the differential diagnosis of these symptoms which can be confused with lumbar disc diseases. Although, with which mechanism intraneural ganglion causes nerve paralysis is discussed, there are difficulties in diagnosis. Besides to define whether the ganglion is intraneural or extraneural, to show its relationship with proximal tibiofibular joint is an important problem. Intraneural ganglion is seen less frequently, radiologists and surgeons encounter with it very rarely in the daily practice. As a result, if the small size of connection with joint is unrecognized and untreated, it can be expected that, it can be resulted as recurrence of ganglion in a high rate.

In this study, a case was presented by reviewing the literature who was diagnosed with lumbar discopathy due to paralysis of the peroneal nerve and treated, and then diagnosed with intraneural ganglion and treated surgically in our clinic.

**CASE PRESENTATION**

Twenty-four year old male patient was admitted to our clinic with the complaints of the ongoing pain, numbness and loss of strength for nine months in the right leg. It was learned that, the patient was diagnosed before with lumbar disc herniation with these complaints and used several drug treatments. In his examination, there was no extension in the ankle and the extension of big toe was weak. In muscle strength assessment, the right tibialis anterior muscle, extensor hallucis muscle, extensor hallucis muscle and peroneal muscles were evaluated as 2/5, 2/5, 2/5, 3/5, respectively. There was tenderness at the level of fibular head and Tinel's sign was positive. There was no palpable mass in the examination. In the medical history taken from the patient, it has been learned that, he had a sport trauma in his knee. In EMG, it has been seen that, there was an advanced degree of the right peroneal nerve neuropathy from the distal part of innervation of biceps femoris muscle at the level of knee. There was no abnormality detected in the muscles innervated by tibial nerve. In the ultrasound, diffuse growing echogenic mass, which was extending along the peroneal nerve, was detected around the fibular head, and interpreted as ganglion cyst. In magnetic resonance imaging, a lobule cystic lesion was detected at the lateral part of the knee (Figure 1a, 1b). The lesion was continuing proximally up to the level that the sciatic nerve separated to its branches as tibial and peroneal nerves and distally was originating from proximal tibiofibular joint (Figure 2a, 2b).

Surgical excision was planned for the patient and approached with an incision from the lateral of the right knee along peroneal nerve under general anesthesia. Peroneal nerve was diffusely thickened around the fibular head and neck (Figure 3). It has been seen that, the cyst was intraneural and continued for an amount along the superficial and deep peroneal nerve at distal and until branching of the tibial and common peroneal nerves at proximal. In the dissection performed, the cyst was found to be associated with proximal tibiofibular joint. The cyst around the nerve was excised, gelatinous liquid was evacuated from the cyst during the excision as expected. The connection between the cysts with the proximal tibiofibular joint along the articular branch of the peroneal nerve was excised and stalk-like structure was ligated to avoid that it occurs again (Figure 4). Histopathological examination of the excised material was consistent with ganglion cyst. Within two weeks after surgery, the patient's clinical improvement in foot dorsiflexion began. It has been observed that, peroneal nerve palsy completely resolved in the follow-up at sixth month and all the complaints of the patient recovered. No recurrence was observed in the control of the second year.
Figure 1: Coronal (a) and sagittal (b) MR image of the left knee shows lobulated and cystic lesion extending along the peroneal nerve

Figure 2: Coronal (a) and sagittal (b) MR image demonstrating the peroneal intraneural cyst and its joint connection to the intraneural cyst at the superior tibiofibular joint
DISCUSSION

Ganglion cysts are benign lesions arising near joints and filled inside with gelatinous mucinous liquid. It is most commonly seen around the wrist and can affect the near nerves with mass effect. The ganglia seen around the nerve can be intraneural or extraneural. In 1901, Hartwell defined firstly a ganglion which was associated with the median nerve\(^{(16)}\). Brooks, in the series with 13 cases associated with peripheral nerves, has reported that, three of them were associated with the peroneal nerve\(^{(2)}\). In 1965, Stack has published a series of ganglion cyst causing compression of the peroneal nerve with nine cases\(^{(15)}\). Spinner, in his series with the review of 23 cases, reported that, all patients had a micro or macro trauma related with the knee\(^{(13)}\). In our patient, there was history of trauma related with the knee.

It has been shown that, intraneural ganglion cysts localized in epineurium of the nerve. The mechanism of formation is still debated\(^{13,14}\). Some authors argue that,

![Figure 3: Intraoperative photograph showing enlarged, thickened common peroneal nerve](image)

![Figure 4: Tibiofibular joint connection of the cyst after excision](image)
intraneural and extraneural ganglia are the variants of the same formation. In our case, ganglion cyst was intraneural and created peroneal nerve compression. Therefore, foot drop developed in the patient. Although a connection between ganglion and the proximal tibiofibular joint is present, this relationship has not been shown in some publications. Spinner argues that, ganglion stems from articular branch of the peroneal nerve. It was claimed that, the ganglion originated from the joint has spread throughout the peroneal nerve and its branches because a weak point in the entrance area of articular branch is created in the proximal tibiofibular joint. We observed that the ganglion had a stalk with lumen showing extension from the joint along the articular branch in our case which supports this hypothesis. We have ligated this stalk to prevent recurrence at the end of the surgery. Spinner has reported that, the articular branch played an important role in recurrence after surgery. In the literature, it has been reported that, recurrences increased up to 20%. The authors are also present who do not think that, ganglion originates from the articular branch and the joint. Poppi identified pure intraneural peroneal ganglion. Tehli, in the case report that he presented intraneural ganglion showing Tinel's to the sciatic nerve, has reported that, ganglion was pure intraneural due to he could not show its connection with the joint. Hextentwever, Spinner argues that, the connection between articular branch and joint cannot be revealed exactly due to some reasons such as being a small connection, being away from the branch or appear to be normal or being not to know this relationship.

Complete excision of cysts was reported to be the most reliable way in the treatment. It has been reported that, cyst aspiration alone resulted in approximately 30% recurrence. However, there are those who argue that, the treatment should be more simple and conservative such as performing the cyst decompression primarily and after that, cyst excision, if it can be made. Spinner has reported that, the connection of cyst with the joint or the stalk should be tied in addition to this treatment and more importantly, the articular branch of the peroneal nerve should be cut completely in the prevention of recurrence. In our case, only this intraluminal stalk was tied after excision due to the connection with the joint was defined, however articular branch was left intact. Near-complete excision of the cyst could be performed. The part, which could not be excised, was decompressed and the nerve was relieved. Cyst recurrence was not detected in the control of the second year.

In preoperative diagnosis, the cystic formation of the lesion facilitates the diagnosis more. To confirm the diagnosis, ultrasound and magnetic resonance imaging are sufficient. It has been reported that, ultrasound, which is inexpensive, non-invasive and effective method, defined cyst as an anechoic and well restricted lesion. However, MRI is more recommended examination in defining its relationship with the surrounding tissue. At the same time, it allows the evaluation of the knee joint in the cysts associated with trauma. It has been reported that, intraneural ganglion can be distinguish from extraneural ganglion with MRI. It has been reported in MRI that, intraneural ganglion was in tubular structure and associated with the joint with the articular branch. We have also seen in our case, the cyst was associated with the joint in MR imaging (Figure 2).

In the differential diagnosis, the pathologies such as L5 root pathology, post-traumatic intraneural haemorrhage, the compression in the nerve created by the tendinous arch formed by the fibular origin of peroneus longus muscle and nerve sheath tumour should be considered. In our case, positive Tinel's sign and
tenderness on the lateral knee around the neck of the fibula was helpful in the differential diagnosis with the L5 root lesion. Further tests may be required to confirm the diagnosis.

As a result, intraneural ganglion cyst should be a diagnosis which is considered in the differential diagnosis of the peroneal nerve palsy as well as the diagnoses such as the root lesion and nerve sheath tumor. The treatment of peroneal intraneural ganglion should be done as surgery quickly and in the surgery, the connection with proximal tibiofibular joint should be cut to prevent recurrence as well as nerve decompression should be done.

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