Intraneural Cyst of the Peroneal and Ulnar Nerves

Report of Two Cases*

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Intraneural cyst is a rare lesion. Probably the earliest case was that of Hartwell5 reported in 1901. The patient had a mass the size of a chestnut on the medial aspect of the arm just above the elbow and at operation it was found to be a cystic tumor involving the median nerve. The contents of such a cyst may be semigelatinous in consistency and result from mucoid degeneration of a schwannoma or a neurilemmoma. An intraneural cyst should not be mistaken for a ganglion which may by proximity cause compression of an adjacent nerve. At times, a connection between a cystic mass and the joint has been found in the vicinity of a nerve traversing a joint such as the knee, suggesting the possibility of synovial origin. The possibility of traumatic origin of an intraneural cyst has been discussed by Brooks.5 It is felt that one of our cases (Case 1) represents post-traumatic cystic degeneration involving the peroneal nerve while the second case is more truly one of mucoid degeneration within the substance of the nerve. In neither of our cases was there a well-formed lining, and on neurolysis the semigelatinous material extruded, leaving behind a space surrounded by the bundles of nerve. There were no unusual extensions of the cystic cavity superiorly or inferiorly.

Recently, Barrett and Cramer1 reported on 4 cases of this condition involving the common peroneal nerve. Later, Cramer2 discussed his experiences with this disease before the Harvey Cushing Society in April, 1964. These authors emphasized the importance of careful dissection during removal of the cysts and suggested that only simple decompression be done when the integrity of the nerve is threatened. They feel that in nonoperative cases distal degeneration of the nerve fibers will occur.

The 2 patients reported upon in this paper were seen within 10 days of each other at the Grace Hospital. Case 1 was operated upon in the Department of Neurosurgery and Case 2 was treated in the Department of Hand Surgery.

Case Reports

Case 1. A. G., a man aged 39 years, was injured in April, 1963, when he jumped off a scaffold, twisting his left foot, left big toe and left knee. Immediately following the accident, there was a left foot drop. There had been no improvement when he was first seen by us in September, 1963. He denied having any injections of antitoxins or vaccines.

Neurological examination revealed an obvious foot drop on the left side. There was some atrophy of the muscles of the left leg lateral to the midline and near the head of the fibula involving the peroneal group of muscles. There was some loss of sensation over the dorsum of the left big toe and the corresponding portion of the foot extending to the lateral aspect of the leg to about the lower third of the leg. Although dorsiflexion of the foot and toes was absent, the patient could evert the foot. No painful mass about the head of the fibula could be discerned.

Electrical Stimulation. Electrical stimulation of the left lower extremity by faradic current resulted in some evasion of the foot without dorsiflexion of the toes. In particular, there was no dorsiflexion of the big toe. It was our impression that there was residual activity in the peroneal distribution but dorsiflexion of the big toe and the foot were absent.

Electromyogram. Electromyography in September, 1963, indicated complete interruption of the anterior tibial branch of the peroneal nerve with an intact medial cutaneous branch supplying the peroneal muscles. Electromyography repeated in February, 1964, indicated axonotmesis of the anterior tibial branch of the peroneal nerve.

Operation. The patient was operated upon in February, 1964. Exposure of the left peroneal nerve on the posterolateral aspect of the left knee revealed a swollen elongated ovoid mass, 8 cm. long, within the substance of the nerve just above its entrance into the muscular bundles of the peroneal group. The nerve was several times its normal circumference. Fluctuation could be felt within the mass. Faradic stimulation of the nerve caused prompt response in its distribution but no dorsiflexion of the big toe was observed. A longitudinal incision was utilized for neurolysis. The cavity was entered and 3.5 cc. of jelly-like, colorless and transparent material escaped. On extending the incision between the bundles, no obvious cystic lining was identified and the bundles of nerves and their connective-tissue covering appeared to form the boundary of the cystic cavity. After hemostasis, the wound was closed but the popliteal fascia was not sutured. Fig. 1 shows the cystic cavity within the peroneal nerve.

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Microscopic Examination. The cystic material was examined by smear. A few red blood cells and mucoid-like material were seen staining a light blue with hematoxylin and eosin. No neoplastic cells or any other abnormal cells were noted. The fluid contained 60 mg. per cent of protein. Electrophoretic curves were not diagnostic.

Comment. In this case, formation of a cystic mass was felt to be the result of an intraneural hemorrhage which eventually became cystic and almost clear in color. The high content of total protein suggests the possibility that this fluid arose from constituents in the blood and tissue debris. The fact that the fluid was almost colorless is somewhat confusing, but the interval between operation and injury was 10 months and absorption of pigments within this period of time is not beyond expectation.

The patient's condition has improved markedly. Eversion of the foot is done very easily. Dorsiflexion of the foot and toes has also returned; some weakness in dorsiflexion of the entire foot is still present at the end of 5 postoperative months. Sensory loss in the superficial peroneal distribution has disappeared.

Case 2. H. D. J. This 47-year-old man had evidence of interosseous atrophy with no involvement of the hypothenar eminence and no sensory loss in the ulnar distribution of the right hand. The condition had been present for about 2 years. About 8 months before examination, there developed sensory loss in the median distribution of the right hand which was treated successfully elsewhere by section of the transverse carpal ligament. However, this did not help the ulnar deficit. Involvement in the distribution of the ulnar nerve included clawing of the ring and little fingers, interosseous atrophy and a positive Froment's sign. There was no sensory loss or involvement of the hypothenar muscles. It was thought that the abnormality of the ulnar nerve should be below the level of the hamate bone in the principal motor trunk.

Operation. The ulnar nerve was exposed at the wrist and dissected out into the palm. The hypothenar branches were stimulated with faradic current resulting in brisk contraction of the hypothenar muscles. The motor branch, on the other hand, when stimulated, appeared nonfunctional. On further dissection, the main motor branch presented a cystic fusiform mass, bluish and translucent, and about 1.5 cm. and 0.5 cm. in diameter. It was intrinsic in the nerve. On incision, gelatinous material was encountered. Excision of the mass and end to end suture of the nerve were not practical. Consequently, after excision of the cystic contents and neurolysis, the wound was closed in layers. A small piece of the wall of the cyst was sent to the laboratory for pathological examination.

Microscopic Examination. The biopsy material showed myxomatous change with infiltration of a few chronic inflammatory cells. A diagnosis of myxomatous cyst of the epineurium was made (Fig. 2).

Postoperative Course. In a 4-month interval, there has been some improvement in that the first dorsal interosseous muscle is active and extension of the ring and little fingers and adduction and abduction of the fingers have improved.

Comment. This patient had no sensory loss in the hand and motor examination revealed an involvement of the interossei with sparing of the hypothenar muscles. The cystic mass involved the chief motor branch of the ulnar nerve. There

Fig. 1. Case 1. Arrows indicate the extent of the cystic cavity after neurolysis.

Fig. 2. Case 2. (Above) Low-power microphotograph showing intraneural cyst of the motor branch of the ulnar nerve in the palm. (Below) Higher power microphotograph of the intraneural cyst.
was no history of injury and the mass, although similar to a ganglion, was entirely intrinsic in the nerve.

Discussion

The etiology in the 2 cases is different. In Case 1, there is apparently a traumatic end result, while, in Case 2, the cystic degeneration was spontaneous in origin. In both, there was mucoid degeneration of the epineurium. Cystic degeneration of tumors of the 8th nerve is seen quite frequently. It represents degenerative change in a neurilemmoma or schwannoma. Yellowish to clear fluid may escape from such cysts; in rare cases, almost all of the tumor may be cystic, with little or no neoplastic tissue in the wall of the cystic mass.

In Case 1, microscopic examination revealed normal nerve elements. The connective tissue lining the cyst was probably of perineural or epineural origin. Hartwell described dense connective-tissue reaction of epineural or perineural origin. His case also showed some degenerating myelin and neuraxial material.

The traumatic origin of Case 1 cannot be disputed. Contusion and hemorrhage with lysis resulting in a cystic mass may be the mechanism. Brooks suggested the possibility that embryonal remains in the nerve might become active and help form the cystic mass. It is surprising to note how seldom this lesion occurs at the epicondylar groove where the ulnar nerve is frequently injured.

These lesions are usually termed nerve ganglions. It is also frequently stated that these masses originate in tendon sheaths or synovial lining. That some ganglions of tendon sheaths or synovial lining may compress or involve an adjacent nerve cannot be denied. However, a cystic mass of neural tissue origin may infrequently occur in a nerve. Our cases belong in this category.

Preoperative palpation of a mass was impossible in both of our cases. In the case described by Hartwell and in some of the cases described by Cramer, a tumor was felt. In the presence of a tumor observed pre-operatively, the diagnosis is more likely to be a schwannoma or neurilemmoma, an invasive tumor, or a malignancy. There is greater likelihood of a tumor if the lesion is a ganglion of a tendon sheath compressing or involving an adjacent nerve.

Summary

Two cases of intraneural cysts have been described. One involved the peroneal nerve near the head of the fibula and the other, the motor branches of the ulnar nerve. One was thought to be traumatic and the other spontaneous in origin.

Peripheral nerves may also be involved by ganglions originating in tendon sheaths or synovial lining. These should not be mistaken for intraneural cysts.

References

3. CRAMER, F. Personal communication.