Acta orthop. scand. 44, 296–302, 1973

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SOLITARY BENIGN NERVE SHEATH TUMORS AROUND THE KNEE JOINT

Report of Four Cases

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Accepted 30.i.73

Benign nerve sheath tumors of the peripheral nerves are relatively uncommon, often misunderstood lesions that are seldom described in Scandinavian literature (Wadstein 1932, Pilgaard 1968). It is surprising that we have treated four cases with such tumors of the peroneal nerve around the knee joint the last year. The purpose of this paper is to present these cases and to review the literature concerning benign peripheral nerve tumors, especially as they occur in the lower extremity.

CASE REPORTS

Case 1 was a 72-year-old driver who for one year had been conscious of a swelling in his left knee. Knocking against this swelling produced radiating pain down the leg and the great toe; sometimes normal activities produced this pain, for instance driving a car. We found a tender round tumor situated laterally in the fossa poplitea. It measured 1.5×1.5 cm and percussion produced radiating pain as described. Neurology and EMG were normal. At operation an encapsulated intraneural tumor in the common peroneal nerve was enucleated. Post-operatively no complications. Pathologic examination showed a typical neurilemoma.

Case 2 was a 83-year-old professor who had tightness in his right knee of six months' duration and diffuse pain in his knee when he walked. He had also noticed a small tumor on the outside of his knee. We found a tumor near the capitulum fibulae. It measured 1×1 cm and was tender to palpation, but did not give rise to radiating pain. Neurology was normal. At operation a multilobulated well-defined tumor was enucleated from the common peroneal nerve. Postoperatively no complication. Pathologic examination showed a neurilemoma (Figure 4).

Case 3 was a 43-year-old teacher who for five years had been conscious of a tender swelling in his left knee. His little daughter once hit the back of his knee and he felt pain in the leg for several days. Without trauma he occasionally had pain and numbness on the inside of the foot. We found a very tender tumor situated laterally in the fossa poplitea. It measured 2.5×3 cm and on pressure pain radiated down to the great toe. Neurology was normal. At operation a well-defined tumor

Table 1. Benign nerve sheath tumors around the knee.

Case	1	2	3	4
Age (years)	72	83	43	66
Sex	male	male	male	female
Duration of symptoms	1 year	½ year	5 years	4 years
Local pain	None	Yes	Yes	None
Radiating pain	Yes	Yes	Yes	None
Tendter to palpation	Yes	Yes	Yes	Yes
Muscle weakness	None	None	None	Yes
Localisation	n. peron.	n. peron.	n. peron.	n. peron.
Size (cm)	comm.	comm.	comm.	r. prof.
	1½×1½	1×1	2½×3	2×5
Pathology	neurinoma	neurinoma	neurinoma	neurofibroma

was enucleated from the common peroneal nerve. Postoperatively no complications. Pathologic examination showed a neurilemoma.

Case 4 was a 66-year-old farmer's wife with complaints of a swelling on the outside of her left knee and easy stumbling with her left foot for four years. We found a multilobulated tumor near the capitulum fibulae. It measured 5×2 cm and was somewhat tender, but pressure did not produce radiating pain. There was no sensory loss but decreased strength in the extensor hallucis muscle and the anterior tibialis muscle. Electromyogram showed affection of the deep branch of the peroneal nerve. At operation a multicystic intraneural tumor was excised from the deep branch of the peroneal nerve. The tumor was not quite well defined, and could not be totally removed (Figures 1 and 2). Pathologic examination showed a neurofibroma (Figure 3). Postoperatively persisting muscle weakness at six months control.

DISCUSSION

There are two main forms of benign peripheral nerve tumors, neurilemoma and neurifibroma (Stout 1949).

The neurilemoma is often also termed neurinoma or Schwannoma (Stener et al. 1963). It is usually a solitary lesion but infrequently multiple lesions occur. It grows slowly and is encapsulated (Harkin & Reed 1969). The tumor is mainly found in major nerves, cranial and spinal nerve roots and peripheral nerves usually on the flexor aspects of the limbs, especially near the wrist, elbow and knee (Bick 1931, Biggart 1949, Dinaker & Balaparameswara 1971, Rosenthal 1971). Neurilemoma of the peroneal nerve near the capitulum fibulae has been reported by so many authors (Das Gupta et al. 1969, Ferguson 1937, Kaplan 1968, Jenkins 1952, Cutler & Gross 1936, Wadstein 1931, and others) that it

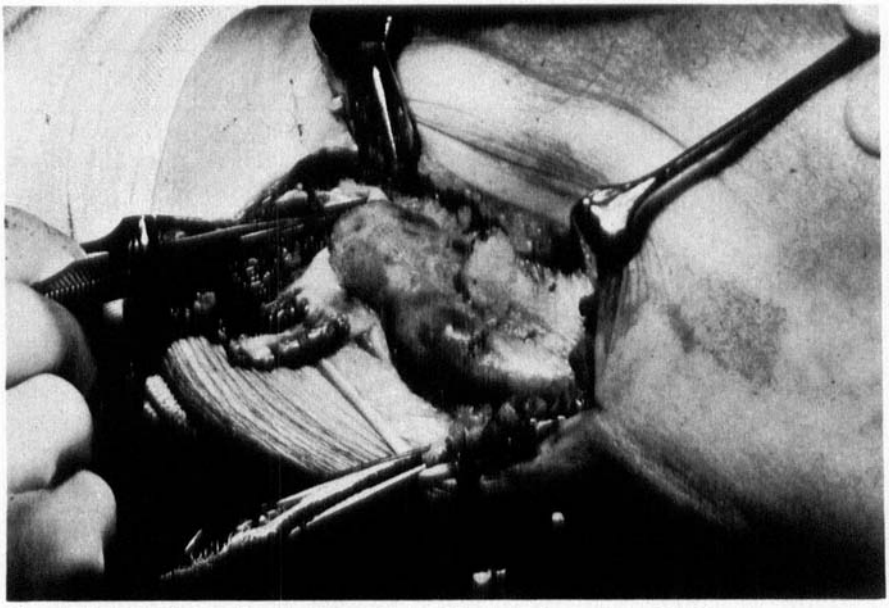

Figure 1. Neurofibroma of the left peroneal nerve near the capitulum fibulae. An intraneural multilobulated tumor.

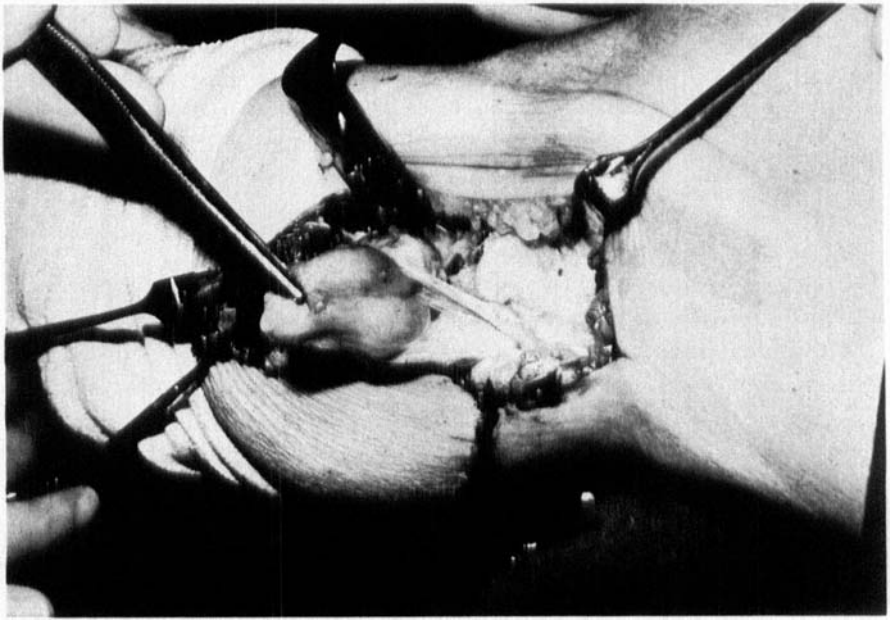

Figure 2. The same patient as in Figure 1. The neurofibroma is dissected free from the nerve. The nerve fibers around the tumor are straightened.

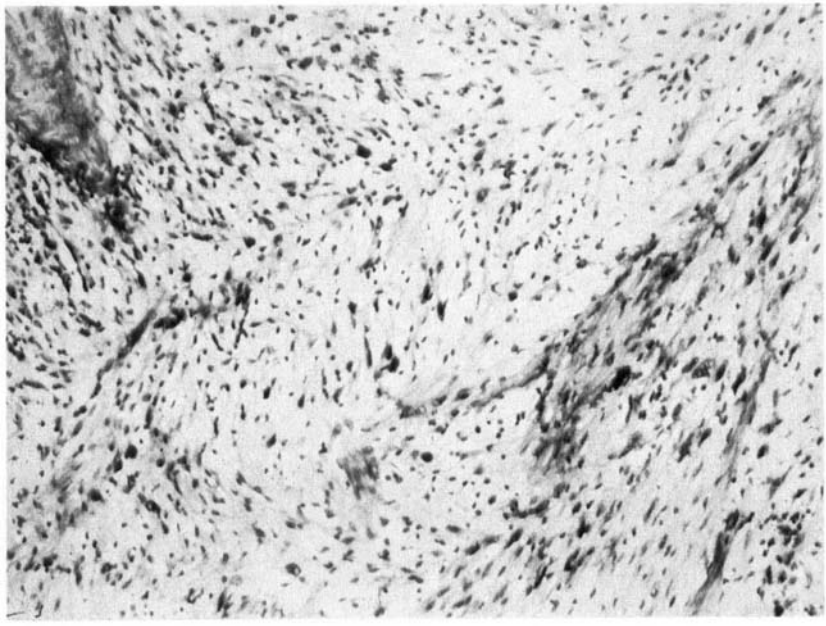

Figure 3. Neurofibroma. Connective tissue stroma, irregularly arranged spindle cells and reticulin fibers. Thickened arteries and cysts are not seen here in contrast to neurilemoma.

has been suggested that this nerve is especially prone to develop these tumors. The size of the tumor may vary: the smaller ones are round and elastic but the bigger are often multilobulated with cystic degenerations centrally. The tumor usually has an eccentric position in the nerve, pushing the nerve fibres to one side, and is covered by a capsule. Enucleation is considered to be the best treatment: incision parallel with the nerve in the epineurium on the side of the tumor and blunt dissection without damage to the nerve fasciculi.

Neurofibroma, sometimes called plexiform benign neurilemoma, may be found as solitary lesions, but are more commonly known as multiple neurofibromatosis or von Recklinghausen's disease (Livingstone 1947, Biggart 1949). They occur more often on the trunk subcutaneously than on the extremities, where they may involve the major nerve trunks. The tumor grows without a capsule, is invasive and is sometimes cystic centrally. Radical excision is difficult. Nerve resection and suture has been recommended if the risk of recurrence is considered to be high (Cutler & Gross 1936). If the growth of the tumor makes nerve suture impossible or if the loss of function cannot be compensated for by

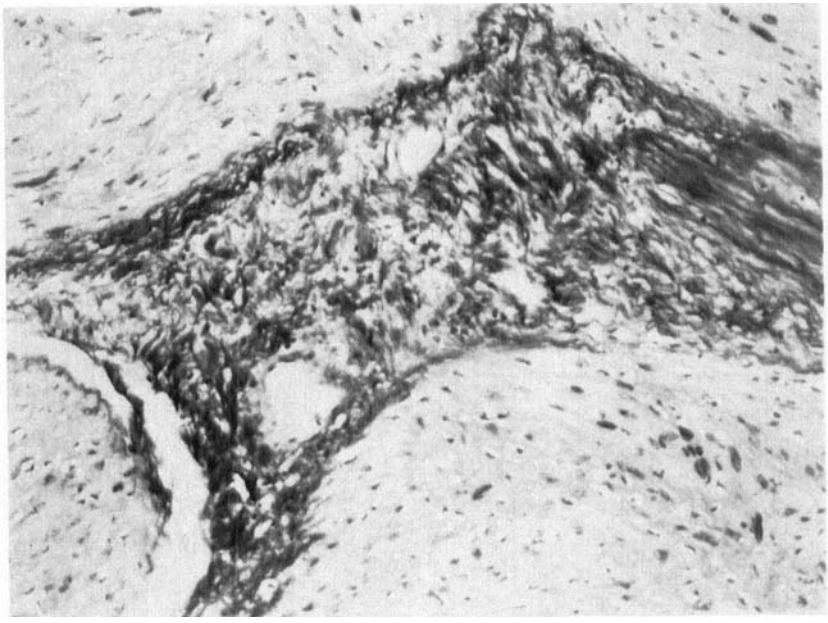

Figure 4. Neurilemoma. In the middle Antoni B tissue with cysts and irregularly arranged pleomorphic cells and fibers. In the corners Antoni A tissue, spindle cells with oval palisading nuclei.

tendon transfers, only biopsy for pathologic examination may suffice (Byrne & Cahill 1961).

On light microscopic examination of neurilemoma two types of tissue have been described, Antoni A and B tissue (Figure 4). Electron microscope reveals in the type A tissue many thin processes from the cell bodies. Under examination with light microscopy the *neurofibroma* consists of a dense connective tissue stroma (Figure 3). Examination with the electron microscope shows that the principal neurofibroma cells have dense and few cytoplasmatic processes (Fisher & Vuzevski 1968, Harkin & Reed 1969).

Malignant transformation of an encapsulated neurilemoma is denied by most authors but has been described (Carstens & Schrodt 1969, Das Gupta et al. 1969, Epstein 1971). About half of all neurogenic sarcomas arise from neurofibromas and approximately 15 per cent of neurofibromas transform into a neurogenic sarcoma (Stout 1958, Cutler & Gross 1936).

Both the neurilemoma and the neurofibroma often grow as symptomless masses that are sometimes tender and may produce pares-

thesias, radiating pains and decrease of sensibility but less often weakness of the muscles. The differential diagnosis preoperatively may be difficult (Buck-Gramcko 1958). Ganglion was suspected in our case 1 where also the possibility of lipoma or fibroma was discussed. Case 3 had been interpreted as a Baker's cyst and in case 4 the patient believed the tumor was a varicose vein. This difficulty in making the right diagnosis preoperatively is well known; in White's (1967) material of 45 patients only five had a correct preoperative diagnosis.

During examination of patients with pain one should remember these tumors. Case 1, for instance, had pain in the leg that simulated a L 5 syndrome. Case 4 suffered from peroneal paralysis and had electromyographic changes. All the described tumors in the peroneal nerve were tender on palpation. The tumor is sometimes movable from side to side but not longitudinally along the nerve trunk. None of our patients had von Recklinghausen's disease.

SUMMARY

Benign tumors of the peripheral nerves are considered to be rather rare. During the last year we have operated upon four patients with such lesions of the peroneal nerve around the knee joint. Diagnosis preoperatively was often obscure. Tender masses without neurologic disturbances were most common. Enucleation is recommended. The literature is examined considering similarities and differences between neurilemomas and neurofibromas.

ACKNOWLEDGEMENT

I wish to thank Dr. Eric Hammar, Pathologic Institution, University Hospital, Lund, for invaluable help with the pathological examinations and pictures.

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