Peripheral nerve tumours in own material

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Peripheral nerve tumours are rather rare soft tissue tumours. In the present article, results of surgical treatment of the peripheral nerve tumours have been presented. Clinical material consisted of 34 patients (16 females aged 19–55 years and 18 males aged 17–75 years). The following surgical procedures were performed: excision of the tumour without damaging the structure of fascicles — 6 cases; excision of the tumour with transsection of 1–2 fascicles — 6 cases; excision of the tumour with transsection of many fascicles — 1 case; excision of the tumour with microsurgical reconstruction of part of the nerve — 6 cases; excision of the tumour without reconstruction of any part of the nerve — 4 cases; arm amputation in 1/3 proximal — 1 case; and evacuation of the intraneural cyst with wall excision — 2 cases. The pre- and postoperative motor and sensory deficit have been evaluated. Three point scale of deficit intensity from + to +++ has been established.

Peripheral nerve tumours were mainly benign and malignant neoplasm was only found in 2 cases. There were no new neurological deficits after surgical treatment. The surgical treatment results depended on the histopathological pattern, size and localisation of tumours and the choice of the optimal operative technique.

key words: peripheral nerve tumours, peripheral nerve neoplasms, neurilemmoma, neurofibroma, malignant neurilemmoma, von Recklinghausen’s neurofibromatosis, microsurgical techniques

INTRODUCTION

Peripheral nerve tumours have rather rare appearance among soft tissue tumours. Most of them are non-malignant tumours (neurofibroma, neurilemmoma) and the malignant neoplasms are found relatively rare (malignant neurilemmoma). Tumours like hamartoma, choristoma, neurothekeoma and granular cell tumour are extremely rare [1, 2, 4, 7, 10–13, 21]. The preoperative diagnostics of the peripheral nerve tumours include clinical examination, electromyography and in certain cases imaging diagnostics (CT, MRI, ultrasound) [19, 21]. The treatment of peripheral nerve tumours is mainly surgical and the final clinical diagnosis is based on the histopathological examination.

MATERIAL AND METHODS

The Department of Trauma and Hand Surgery (Medical University of Wrocław) surgically treated 34 cases of peripheral nerve tumours in the period 1983–2002. Clinical material consisted of 16 females aged 19–55 years and 18 males aged 17–75 years. Peripheral nerve tumours were localised in large neural trunks and in small cutaneous branches. The localisation of tumours in large neural trunks is shown in Table 1, whereas that of tumours in small cutaneous branches is shown in Table 2.

In 26 cases, peripheral nerve tumours were localised in the upper extremity and in 8 cases they were localised in the lower extremity.

The following surgical procedures were carried out during the treatment:
I. Large nerve trunks

1. Excision of the tumour without damaging the structure of fascicles — 6 cases
   - neurilemmoma — 5 (Table 3, no. 13, 16, 17, 18, 25)
   - haemangioma — 1 (Table 3, no. 12)
2. Excision of the tumour with transection of 1 fascicle — 5 cases
   - neurilemmoma — 4 (Table 3, no. 2, 3, 9, 11)
   - neurofibroma — 1 (Table 3, no. 20)
3. Excision of the tumour with transection of 2 fascicles — 1 case
   - plexiform neurofibroma (Table 3, no. 26)
4. Excision of the tumour with transection of many fascicles — 1 case
   - neuroma “in continuity” lateral (Table 3, no. 22)
5. Excision of the tumour with microsurgical reconstruction of part of the nerve — 6 cases
   - direct nerve suture — 1 case
   - neurofibroma (Table 3, no. 10)
   - sural nerve grafting from 4 to 25 cm — 5 cases
   - neurofibroma (Table 3, no. 24)
   - plexiform neurofibroma (Table 3, no. 19)
   - myxomatous neurofibroma (Table 3, no. 14)
   - hamartoma (Table 3, no. 1)
   - neurilemmoma Anton A (Table 3, no. 6)
6. Excision of the tumour without reconstruction of any part of the nerve — 4 cases
   - neurilemmoma — 2 cases (Table 3, no. 15, 21)
   - malignant neurilemmoma — 1 case (Table 3, no. 8)
   - neurofibroma — 1 case (Table 3, no. 23)
7. Arm amputation in 1/3 proximal — 1 case
   - neurogenic sarcoma (Table 3, no. 7)
8. Evacuation of the intraneural cyst with wall excision — 2 cases (Table 3, no. 4, 5)

II. Small cutaneous branches

1. Tumour excision — 8 cases

In the group of patients with peripheral nerve tumours localised in large neural trunks, pre- and postoperative motor (Lovett test) and sensory deficit (BMRC scale) have been evaluated [23]. Three point scale of deficit density from + to +++ (small, medium, large deficit) has been established.

RESULTS

Pre- and postoperative motor and sensory deficits are shown in Table 3.

Based on the histopathological examination, we found the following types of tumours:

I. Benign neoplasms — 28 cases
   A. Large neural trunks
      1. neurilemmoma — 12 cases (Anton A — 8, Anton B — 2, Anton AB — 2)
      2. neurofibroma — 4 cases
      3. plexiform neurofibroma — 2 cases
      4. myxomatous neurofibroma — 1 case
      5. intraneural haemangioma — 1 case
   B. Small cutaneous branches
      1. neurofibroma — 5 cases
      2. myxomatous neurifibroma — 1 case
      3. neurilemmoma (Anton A) — 1 case
      4. cellular neurilemmoma — 1 case
   II. Malignant neoplasms — 2 cases
      1. malignant neurilemmoma — 1 case
      2. neurogenic sarcoma — 1 case
   III. Intraneural ganglia — 2 cases
   IV. Hamartoma — 1 case
   V. Neuroma “in continuity” lateral — 1 case (Fig. 1)
In our material, surgically treated peripheral nerve tumours were benign (Fig. 2A, B) and we only found a malignant pattern in 2 cases. Other authors have reported similar observations, mainly concerning non-malignant tumours [2, 14, 15, 21, 22, 24]. Peripheral nerve tumours were localised in ulnar (8 cases), median (7 cases) and radial (3 cases) nerves. These are the most frequent localisations of this type of tumours [7, 20].

Neurilemmoma and neurofibroma occur mainly as a single tumour. However, multiple tumours are also rarely noted [3, 15]. In the analysed material, we found multiple peripheral nerve tumours in 2 cases. They were localised in median nerve (2 tumours of neurofibroma type (Table 3, no. 20) and in ulnar nerve (3 tumours of neurilemmoma Anton B type (Table 3, no. 13, Fig. 3A, B). Among the neoplasms localised in large trunks, the neurilemmoma (12 cases) and neurofibroma (7 cases)

<table>
<thead>
<tr>
<th>Case no.</th>
<th>Patient data*</th>
<th>Localisation</th>
<th>Motor deficit**</th>
<th>Sensory deficit**</th>
<th>Paraesthesia**</th>
<th>Pain**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>MS 17 M</td>
<td>Median nerve</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>2.</td>
<td>SZ 53 F</td>
<td>Median nerve</td>
<td>–</td>
<td>++</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>3.</td>
<td>DJ 24 M</td>
<td>Medial cutaneous arm nerve</td>
<td>–</td>
<td>++</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>GM 18 M</td>
<td>Common peroneal nerve</td>
<td>+++</td>
<td>–</td>
<td>++</td>
<td>–</td>
</tr>
<tr>
<td>5.</td>
<td>IK 20 M</td>
<td>Common peroneal nerve</td>
<td>+++</td>
<td>?</td>
<td>+++</td>
<td>?</td>
</tr>
<tr>
<td>6.</td>
<td>CM 44 F</td>
<td>Common peroneal nerve</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>7.</td>
<td>MS 44 F</td>
<td>Median nerve</td>
<td>+++ amp.</td>
<td>+++ amp.</td>
<td>+++ amp.</td>
<td>++ amp.</td>
</tr>
<tr>
<td>8.</td>
<td>MD 22 F</td>
<td>Sciatic nerve</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>9.</td>
<td>ZJ 34 M</td>
<td>Superficial peroneal nerve</td>
<td>+</td>
<td>–</td>
<td>++</td>
<td>–</td>
</tr>
<tr>
<td>10.</td>
<td>MB 36 F</td>
<td>Superficial branch of radial nerve</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>11.</td>
<td>SA 56 M</td>
<td>Radial nerve</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12.</td>
<td>RM 20 F</td>
<td>Ulnar nerve</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>13.</td>
<td>SL 32 F</td>
<td>Ulnar nerve</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>14.</td>
<td>CJ 29 M</td>
<td>Ulnar nerve</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>15.</td>
<td>SB 43 F</td>
<td>Ulnar nerve</td>
<td>+++ amp.</td>
<td>+++ amp.</td>
<td>+++ amp.</td>
<td>++ amp.</td>
</tr>
<tr>
<td>16.</td>
<td>OJ 44 F</td>
<td>Ulnar nerve</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>17.</td>
<td>PA 54 F</td>
<td>Ulnar nerve</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>18.</td>
<td>KJ 75 M</td>
<td>Median nerve</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>19.</td>
<td>TJ 29 M</td>
<td>Median nerve</td>
<td>+</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>20.</td>
<td>JJ 3 F</td>
<td>Median nerve</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>21.</td>
<td>BH 50 F</td>
<td>Median nerve</td>
<td>++ amp.</td>
<td>+</td>
<td>++ amp.</td>
<td>+</td>
</tr>
<tr>
<td>22.</td>
<td>ŚW 26 M</td>
<td>Sciatic nerve</td>
<td>++ amp.</td>
<td>++ amp.</td>
<td>++ amp.</td>
<td>++ amp.</td>
</tr>
<tr>
<td>23.</td>
<td>CA 19 F</td>
<td>Sural nerve</td>
<td>–</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>24.</td>
<td>KR 17 M</td>
<td>Superficial branch of radial nerve</td>
<td>–</td>
<td>–</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>25.</td>
<td>PJ 18 M</td>
<td>Ulnar nerve</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>26.</td>
<td>GK 27 F</td>
<td>Ulnar nerve</td>
<td>–</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

*Initials, age (years), sex: M — male, F — female
**Scale of deficit intensity from + to +++
amp. — amputation
were the most frequently observed. We found plexiform variation of neurofibroma in 2 patients (Table 3, no. 19, 26) and myxomatous variation of neurofibroma in 1 patient (Table 3, no. 14). Plexiform neurofibroma is reported to be a pathognomic of the Recklinghausen disease type 1 [22] and carries the risk of malignancy in about 10% of cases [6, 7, 17]. In our cases, two patients showed no signs of Recklinghausen disease.

Peripheral nerve tumours from small cutaneous branches had histopathological pattern of neurofibroma (6 cases) and neurilemmoma (2 cases). Neoplasms localised on fingers (3 cases) were only neurofibroma type. Neurofibroma occurs more often than neurilemmoma in fingers [16, 18] and makes up 1–3% of all hand tumours [11]. Excision of single neurofibroma located in subcutaneous tissue requires ruling out Recklinghausen disease in patients [22]. On the other hand, it is not indicated whether many small, asymptomatic tumours in patients with classical generalised form of Recklinghausen disease should be excised. The surgical treatment should be reserved for fast growing and progressive symptomatic tumours [2, 5, 9]. In our material, 1 patient with generalised Recklinghausen disease was qualified for an operation (Table 3, no. 21). The surgical treatment in this case has only palliative importance and was focused on pain remission.

The surgical procedures were performed with microsurgical techniques and specialist devices (loupes...
and microscopes). Excision of the tumour without damaging the fascicle structure was possible in 6 cases. Excision of the tumour with transsection of 1 or 2 fascicles was performed in 6 cases. There were no new postoperative neurological deficits in these cases. However, it’s important to remember about the possibility of this kind of complication [14]. The risk of postoperative new neurological deficit is about 4% [5].

Excision of tumours with microsurgical reconstruction of part of the nerve (direct suture reconstruction, grafting of the sural nerve) was performed in 6 cases. In this group, recovery of function was observed in 4 cases; and no recovery was observed in 2 cases (Table 3, no. 6, 14). In 4 cases, excision of tumours without reconstruction of any part of the nerve was performed. These exceptional cases included: “en bloc” resection of the recurrent malignant neurilemmoma of the sciatic nerve (Table 3, no. 8), excision of the neurilemmoma Anton B of the median nerve in patient with Recklinghausen disease (Table 3, no. 21), excision of the neurilemmoma localised in the early damaged ulnar nerve (Table 3, no. 15), and excision of the neurofibroma of the sural nerve (Table 3, no. 23, Fig. 4).

In one case, the reoperation was carried out after 2 years due to the recurrence of neoplasm (myxomatous neurofibroma). Finally, resection of the tumour with part of the ulna nerve was performed with immediate grafting by the sural nerve — 3 implants of 4 cm (Table 3, no. 14). Results of treatment of the peripheral nerve tumours depend on the character of the tumour, proper qualification for treatment as well as on the choice of the optimal operative technique [8].

REFERENCES