50 years of peripheral nerve surgery: a neurologist’s view

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Summary


When the author started his training as a neurologist exactly 50 years ago, the only diagnostic tools used were clinical examination and testing of excitability of peripheral nerves and muscles by electrical square waves impulses. The EMG was introduced to Switzerland in 1953. In the early fifties of the last century the carpal tunnel syndrome was redetected and became clinically important. Then a real boom of entrapment syndromes began and also became somewhat exaggerated. Lesions of peripheral nerves were repaired 50 years ago by every general surgeon and suture under tension was too frequently applied. Finally interponates were used. It had to be shown that only autotransplantates were really successful. The technique of peripheral nerve surgery got more and more sophisticated and more and more specialists were trained. The widespread use of the microscope started. Nowadays the peripheral nerve surgeon is by himself an excellent specialist, not only in the treatment but also in the diagnosis of peripheral nerve lesions.

Keywords: peripheral nerves; neurosurgery

Introduction

It is an honour and a privilege to be the one to present this subject today. I was probably chosen because I am the only one who is old enough to have practised for and thus is able to overlook a period of 50 years. As a matter of fact I started my training as a neurologist in 1952, precisely 50 years ago. But also otherwise I am entitled to present this subject today: my brother was an orthopaedic surgeon and he was trained in peripheral nerve surgery in the United States. For many years he was an active surgeon and operated on many of my patients with peripheral nerve lesions. He was also the first co-author of a textbook I edited on peripheral nerve lesions and wrote the surgical part of it.

The first step in my personal academic career was what we in German call “Habilitationsschrift”, which is a kind of postdoctoral thesis. It was a meticulous and detailed description of 412 patients with ulnar nerve palsies [1]. Its 406 pages described the general symptomatology, the different aetiological groups of ulnar paralysis and the relationship with Dupuytren’s contracture.

Together with Hans Schliack and later on with Manfred Stöhr and Hermann Müller-Vahl, I was author and editor of a textbook on peripheral nerve lesions, of which we have now prepared the 8th German edition and which has appeared in 5 languages [2]. From the very beginning, a large part of the book was dedicated to peripheral nerve surgery and written by surgeons. Previous editions were prepared by Algimentas Narakas and the last two by Hanno Millesi.

I must confess that originally I had planned to become a neurosurgeon, but then I prolonged the neurological part of my training and finally made it a life-long prolongation.

Hopefully, all these points explain why I am here today with you to give this talk.

50 years of peripheral nerve surgery as seen by a neurologist

I could cut a long story short and just say: the therapeutic progress of peripheral nerve surgery has been one of the most rewarding for neurologists.

1 Presented at the 169th Meeting of the Swiss Neurological Society (Zug, May 24, 2002).
However, you would probably like to hear more, so let me proceed in chronological order.

In the beginning of the 1950s we had to base our diagnosis of peripheral nerve lesions just on clinical findings. To evaluate the degree of denervation and reinervation we used Tinel’s sign and the only neurophysiological method was the galvanic and faradic stimulation with square-waves. We just observed the characteristics of the contraction and this indicated the degree of denervation.

The very first patients I saw as a resident in neurology having a traumatic lesion of peripheral nerves had for example a section of the median nerve at the forearm after a fall with a milk-bottle – which then was still made of glass and not of plastic. A primary suture was aimed at. When a larger defect was present and a secondary suture had to be done, the nerve was mobilised as far as possible.

If the lesion was not a primarily traumatic one, the neurologist was the one who sent the patient to the surgeon. The neurologist was the expert on peripheral nerves. The general surgeon did not like peripheral nerves too much.

It was also in the early 1950s when carpal tunnel syndrome was rediscovered in Europe. It had already been very well described in an autopsy case by P. Marie and C. Foix in Paris in 1913 and they had also shown that the syndrome was due to a compression of the nerve beneath the transverse ligament at the wrist [3]. However, it took another 40 years until the syndrome was more frequently diagnosed in clinical cases. As a young neurologist I had to teach my non-neurological colleagues, and also surgeons, that carpal tunnel syndrome was the most frequent cause of nocturnal brachial pain. I had to persuade the sceptic general surgeon to proceed and explore the wrist of my patients and very frequently I myself assisted the surgeon in the operation theatre. In this way I could finally satisfy part of my surgical ambitions. The diagnosis at that time was a purely clinical one.

The lack of success of primary nerve sutures done under tension, the limited amount of mobilisation of peripheral nerves in order to overcome defects encouraged surgeons to bridge defects with interponates. I remember the period when homologous nerve grafts of preserved peripheral nerves were used. In German newspapers at the end of the 1960s reports were published of unbelievably successful nerve reconstructions with this method. It was the merit of the German Neurosurgical Society that they wanted to make a critical evaluation of these vociferous reports. It was thanks to their chairman, Professor Kuhlendahl, that they did not charge a surgeon to do this, but that they asked a German neurologist, Professor Schliack from Berlin, a German neurophysiologist, Professor Struppler from Munich, and a neutral Swiss neurologist – me – to visit the neurosurgical departments where peripheral nerves were operated on and to evaluate their results. We did this by questioning and clinically examining their patients and by electrophysiological testing. The result was published in 1972, also in the Acta neurochirurgica and additionally in a neurological German journal [4]. I am happy to tell you on this occasion once again that the only department where patients were really successfully operated on was in the department of neurosurgery in Mainz, headed by Professor Schürmann, and where the peripheral nerves were operated on by Hans Reulen and Madjid Samii. They exclusively used autologous nerve grafts, and so the preserved homologous grafts were definitely abandoned.

A little bit later the entrapment syndromes were discovered. I have already mentioned the very first one, carpal tunnel syndrome. However, more and more entrapment syndromes were described and the first monograph by Kopell and Thompson, which appeared in 1963, inaugurated a new era [5]. I myself was able to contribute with the description of 35 cases of tarsal tunnel syndrome. There was a real boom in entrapment syndromes, many of which were operated on. Also in this field, as so often happens in medicine, a newly detected disease entity became “in” and was diagnosed too easily. More and more patients were therefore operated on without a sufficient indication. Whilst in the 1950s I had to preach to my colleagues that there existed entrapment syndromes and one had to be aware of them, I now increasingly had to explain to non-neurologists that not every brachial pain is due to carpal tunnel syndrome, an atrophy of the interosseal muscles in the hand is not always due to an ulnar groove syndrome and a tennis elbow is not the expression of a supinator syndrome.

The great leap in the successful surgical treatment of peripheral nerve lesions became possible thanks to the use of the operating microscope. I remember when I had an opportunity to assist one of my surgical colleagues and to look at a peripheral nerve suture through the microscope: it was just amazing how many details one could see.

Concerning the correct indication for surgery and the critical evaluation of the results, I remember one impressive meeting with Algimentas Narakas in the early 1980s. The subject was surgery of obstetrical paralysis of the brachial plexus. Once again I was the only nonsurgeon among peripheral
nerve surgeons and reported our experience of the natural history of this type of palsy which we had published in *European Neurology*. I claimed that the lower plexus recovers only extremely rarely and in a very incomplete way and that on the other hand the upper plexus also spontaneously has quite good chances to recover without surgical procedure. I therefore doubted the need to immediately operate on every baby with an obstetrical brachial plexus palsy. I should never have said that. I was nearly stoned to death by the surgeons. Quite recently, in 1999, Kay confirmed my conclusions in his paper in *Lancet*.

One important contribution of neurologists to the diagnosis of peripheral nerve lesions was the increasing accuracy of electrophysiological techniques. As already mentioned, in the early 1950s, we just used the conventional galvanic and faradic stimulation of peripheral nerves and muscles. Imaging was in the periphery limited to regular X-rays and for central nervous lesions to pneumoencephalography, arteriography and myelography. Electromyography was introduced to Switzerland by Dr Fritz Lehner in Zurich. He learned the technique with Dr Scherrer in the Salpêtrière in Paris and in Sweden 1953 with Kugelberg in the Karolinska Institutet in Stockholm. Electromyography and electroneurography became an increasingly important aid for the topographic and aetiological diagnosis of peripheral nerve lesions. However, there were also pitfalls, mainly when the electrophysiological findings were not critically evaluated and the history and the whole clinical picture were not also taken into consideration. A slowing of conduction in the ulnar nerve at the elbow could lead to the diagnosis of an ulnar groove syndrome, if one forgot that in general in this region there is also a slowing in healthy people. A local slowing can also be the expression of a neuropathy with multiple conduction blocks, a CIDP, and does not necessarily mean a local compression of the nerve.

In the beginning of peripheral nerve surgery, those who did it were mainly self-learnt men. They were general surgeons, neurosurgeons or orthopaedic surgeons. So the first peripheral nerve surgeons came from very different fields of surgical medicine, some were orthopaedic surgeons like Giorgio Brunelli, some were neurosurgeons like Madjid Samii and others were general surgeons like Hanno Millesi. They were the pioneers of this new field of surgery, which became an increasingly independent specialty. The training of a peripheral nerve surgeon is now well structured and frequently combined with training as a plastic surgeon. An independent research field developed and numerous specialised scientific journals began to appear. Today one could not imagine a surgeon working in this field who does not have specific training as a peripheral nerve surgeon.

This means that the peripheral nerve surgeon has not only become an increasingly sophisticated specialist in the treatment of peripheral nerve lesions, but is also fully competent in the diagnostic evaluation of his patients [6–12]. He also does the basic research work in this field, as we have been shown this morning. Thus one question of course comes to the mind of the neurologist: Is there still a need for neurologists in the field of peripheral nerve lesions? Well, I think there still is. In addition to the neurologist’s knowledge of classical clinical aspects of peripheral nerve paralysis, the neurologist also knows from his general neurological experience about quite a number of diseases which might mimic peripheral nerve lesions: myopathies, amyotrophic lateral sclerosis, sensory deficits of the hand in astereognosis and so on. I therefore think there is still a place for neurologists in the diagnostic evaluation of patients with clinical symptoms which could – but not necessarily must – be due to a peripheral nerve lesion. Among neurologists there is indeed a revival of interest in peripheral nerve lesions. Three years ago, the German Neurological Society for the first time in its history started special seminars on peripheral nerve lesions at its annual meetings. Final remarks

Let me now summarise what I have experienced in the field of peripheral nerve surgery during the past 50 years.

- I have seen with great satisfaction
  - that lesions of peripheral nerves have increasingly been considered by neurologists,
  - that the surgical treatment by peripheral nerve surgeons has become more and more successful,
  - and that research and critical evaluation of results have rendered surgical interventions more efficient and technically optimised.

Looking at the future I would like that

- the medical neurologist knew more about peripheral nerve lesions,
- he considers the surgeon not as the one who replaces him but the one who helps him to cure his patients,
- the peripheral nerve surgeon considers the neurologist as a colleague who could be helpful in some atypical cases
- and possibly the one who also could help to evaluate results of surgery in an objective and critical way.
References