

## Intraoperative Monitoring using NAP (Neurogenic Action Potential)

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### INTRODUCTION

We present the case of a 69 year old man followed by neurosurgery for 4 years for radicular pain in the territory of the left L5 root who during a pre-surgical neurophysiological examination for spine monitoring reported having noticed a painful lump on palpation on the posterior aspect of the left thigh which after imaging studies (ultrasound and MRI) resulted in a tumour dependent on the sciatic nerve before its division which after post-surgical anatomical-pathological analysis turned out to be a SCHWANNOMA (neurilemoma). Pathological analysis turned out to be a SCHWANNOMA (neurilemoma).

### COMPLEMENTARY TESTS

#### Ultrasound Scan of the Left Lower Limb (December 18)

Ultrasound scan aimed at assessing a lump on the posterior margin of the lower limb: In the area where the patient refers the lumpoma, a hypoechogenic tumour with well-defined margins is observed with discrete posterior acoustic reinforcement and continuity with the sciatic nerve cranially and caudal to the lesion. The ultrastructure is quite homogeneous, with an approximate size of 3.2 cm in the longitudinal axis and 2.7 × 2.5 cm in its transverse axes.

Conclusion: Neurogenic tumour dependent on the distal portion of the sciatic nerve, showing no signs of sarcomatous degeneration, to assess schwannoma, without being able to rule out neurofibroma (Figure 1).

#### RMN Left Lower Extremity (January-19):

MRI of a soft tissue tumour compatible with a neurogenic origin dependent on the sciatic nerve, as evidenced by ultrasound study:

Confirmed solid tumour with well-defined margins, located in the middle third of the thigh, in continuity

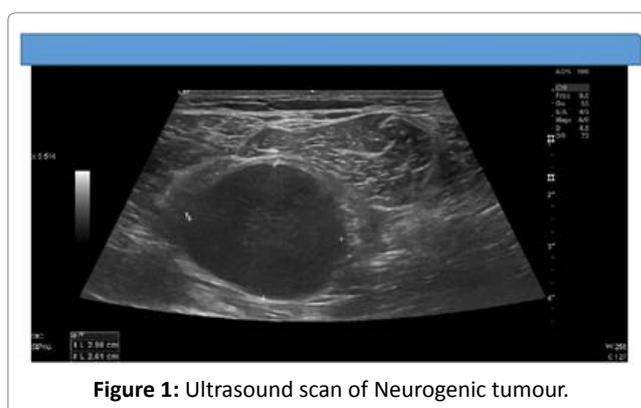


Figure 1: Ultrasound scan of Neurogenic tumour.

with the fascicles of the sciatic nerve, just proximal to the bifurcation of the same. The tumour measures 3.4 and 2.6 × 2.8 cm in its anteroposterior and transverse axes. Conclusion: Neurogenic tumour dependent on the sciatic nerve, compatible with schwannoma versus neurofibroma, without imaging findings suggestive of malignant transformation (Figure 2).

### MATERIAL AND METHODS

#### Surgical procedure:

Prone position, asepsis and antisepsis, longitudinal linear incision in posterior aspect of left thigh, interfascial dissection, localisation of common sciatic nerve dependent tumour, continuous neurophysiological monitoring, proximal and distal electrode placement on sciatic nerve, mapping with bipolar stimulator during resection. Extracapsular tumour dissection, fascicle-dependent tumour mapped and silent, complete enbloc resection.

No drop in nerve action potential detected at any time during surgery. Haemostasis. Closure by planes. Tumour sent for PA.

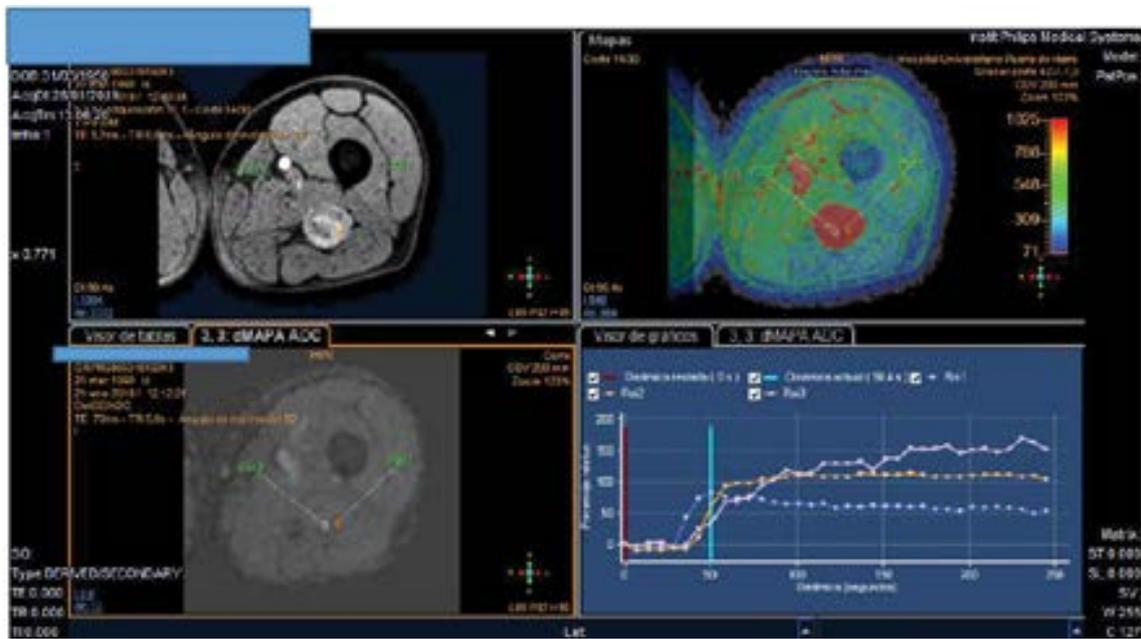


Figure 2: MRI of a soft tissue tumour.

## Two Recording Modalities for Intraoperative Monitoring were Used

Bipolar probe mapping of the tumour looking for

silent areas without CMAPs (compound muscle action potentials) for resection. Gastrocnemius, Tibialis anterior, Extensor digitorum brevis and Abductor hallucis left were used as recording muscles (Figures 3-8).

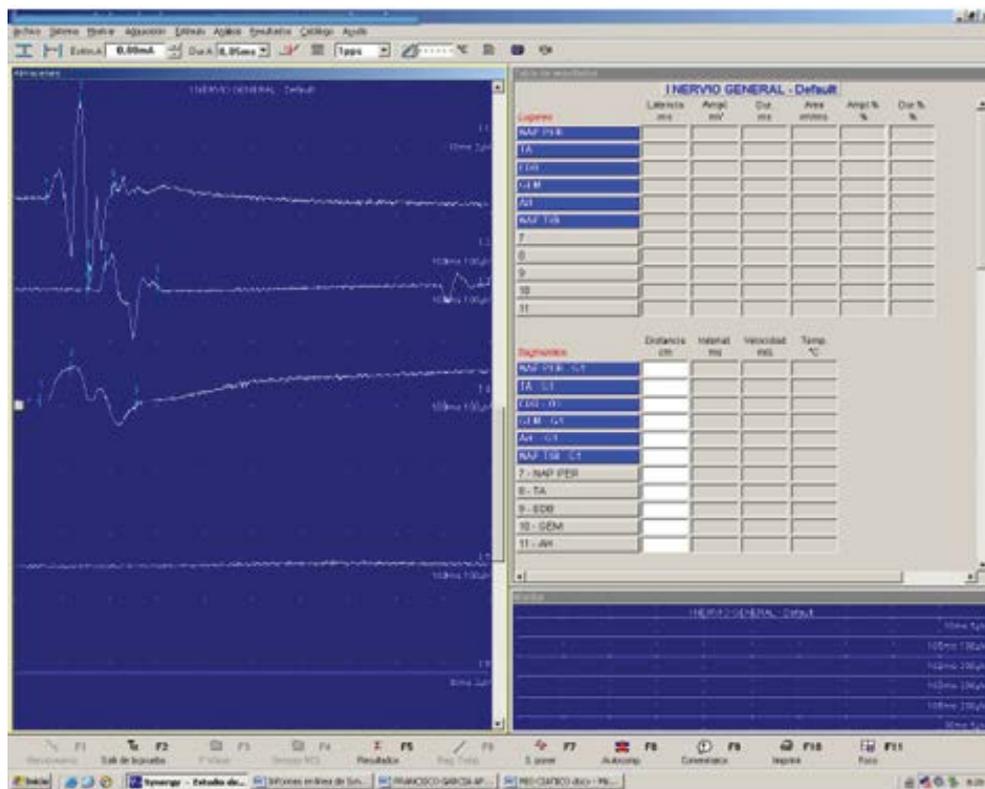


Figure 3: Continuous NAP (neurogenic action potential) monitoring with stimulation proximal and recording distal to the tumour.

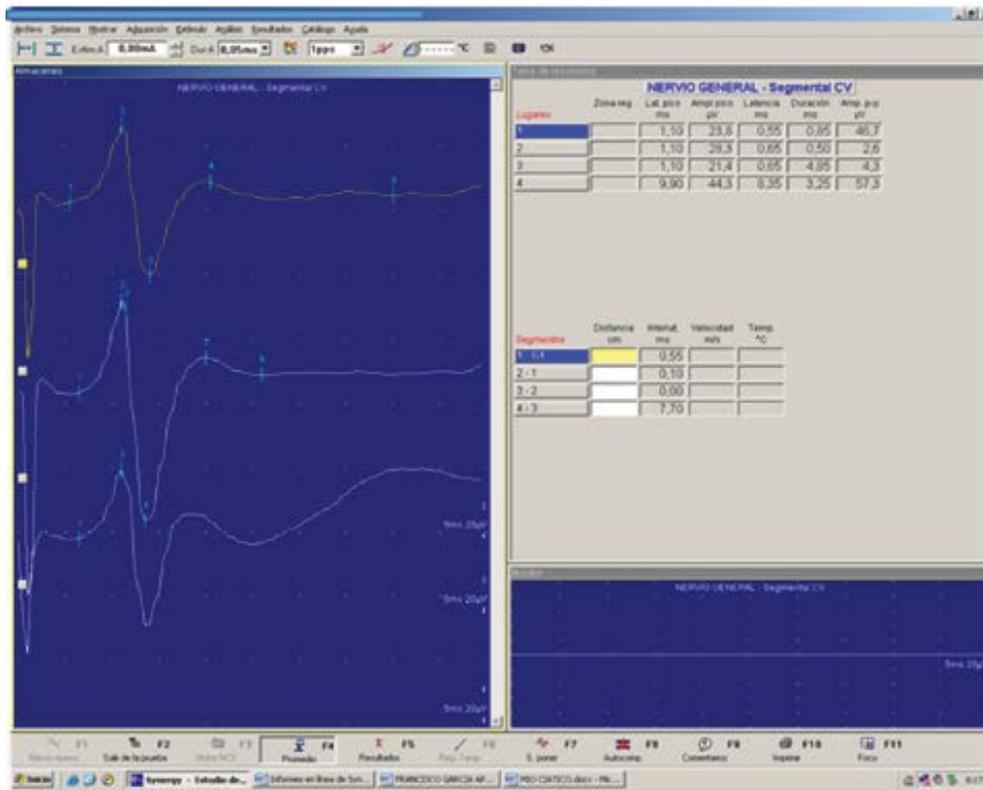


Figure 4: Stable NAP responses were obtained during monitoring with no disappearance of the potential at any time during surgery.

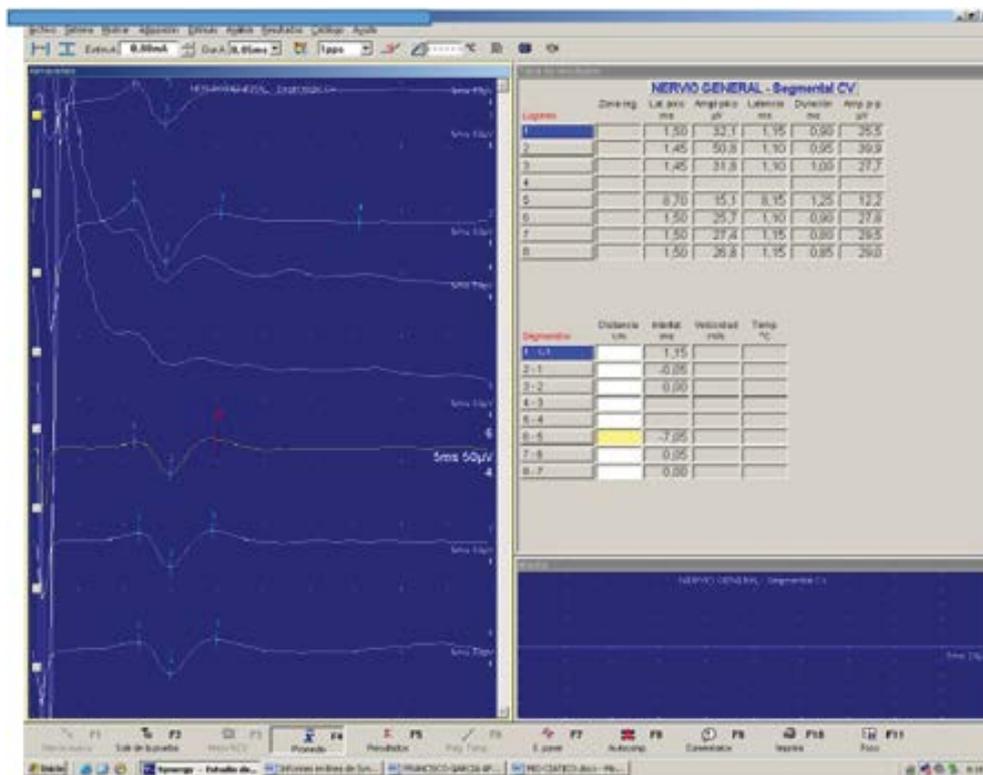


Figure 5: The last three signals have already spread the tumour.

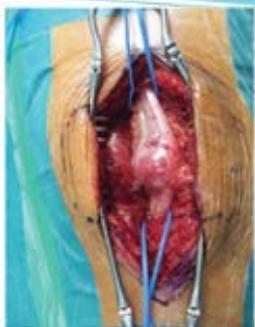


Figure 6: Tumor.



Figure 7: NAP (Neurogenic Action Potential).



Figure 8: Tumor specimen resection.

During resection, the structure was mapped to look for silent areas with no CMAPs recorded in the recording muscles and these areas were used to respect the lesion. Fascicles with muscle response were not resected.

### ANATOMOPATHOLOGICAL DIAGNOSIS

“Left sciatic nerve: SCHWANNOMA (neurilemoma).

### RESULTS

The entire tumour was excised.

The patient was discharged after 48 hours without any neurological deficit with disappearance of his previous pain.

### LIMITATIONS

The presentation of a single case does not allow us to generalise the results, but it can serve as a guide for other neurophysiologists to use this simple and very useful technique.

As the sciatic nerve is a very thick nerve, there were difficulties in keeping the electrode in place and the electrode had to be repositioned on occasion. After these relocations, the initial recording was the same as the final recording, with no evidence of changes in latency or amplitude.

### CONCLUSION

The mapping of muscle structures dependent on the peripheral nerve provides security for the resection of tumours dependent on nerve fascicles that without this tool it would not be possible to determine whether they are functional or not and could produce a transient or definitive partial or total paresis of the structure that it preserves.

The preservation of the NAP until the end of the surgery ensures that the nerve will be functional even if it presents post-surgical paresis.

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