

# The role of the longitudinal extent of ultrasonographic abnormalities in ulnar and peroneal entrapment neuropathies as predictive outcome.

*Grazia Devigili, Sara Rinaldo, Vittoria Nazzi, Ignazio Gaspare Vetrano,  
Ramona Togni, M. Corradi, Mikael Izzo, V. Catanzaro, Ylenia Melillo, Paola  
Lanteri, Roberto Eleopra*



Fondazione I.R.C.C.S.  
Istituto Neurologico Carlo Besta

*Fondazione IRCCS Istituto Neurologico Carlo Besta,  
Department of Clinical Neurosciences, Milan, Italy*



# Background

Clinical diagnosis of the peroneal neuropathy at the head of fibula and the ulnar neuropathy at the elbow is confirmed by EDX and also supported by US.

US features:

- swelling of the nerve proximal to the site of compression
- Nerve hypoechoic secondary to edema
- Abnormality during dynamic test

# Aim of study.

In order to improve the availability of **reliable ultrasonography (US) *additional* measures** in entrapment neuropathies and **define the eligibility for surgery**, we aimed to evaluate *the length* of abnormal nerve segments (LANS) in ulnar and peroneal entrapment neuropathies using US, before surgery and after surgery.

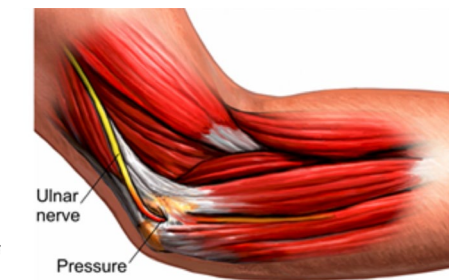
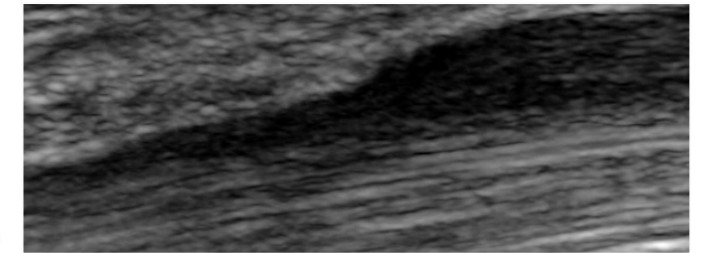
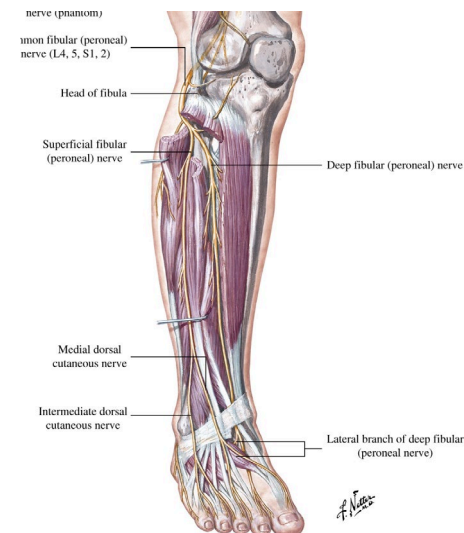
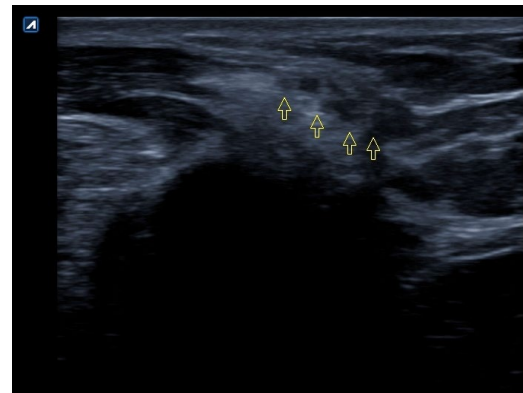
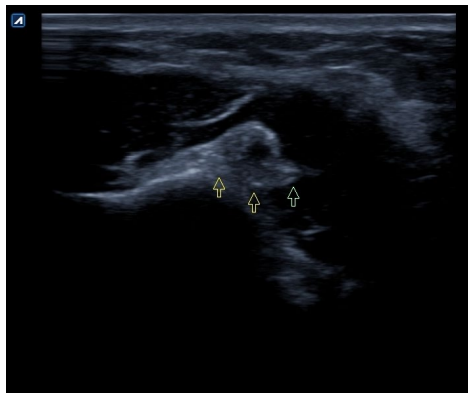
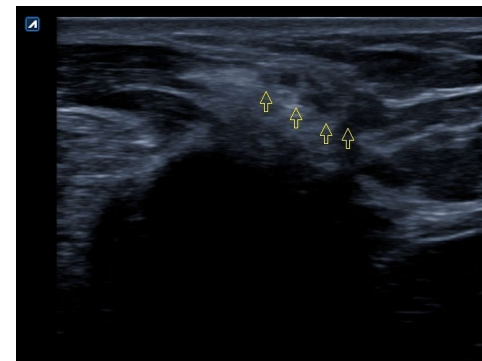
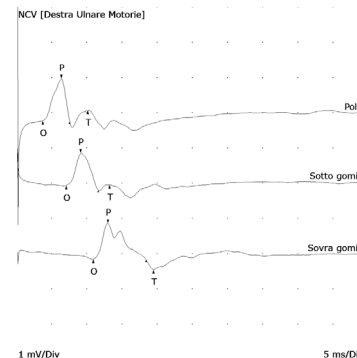
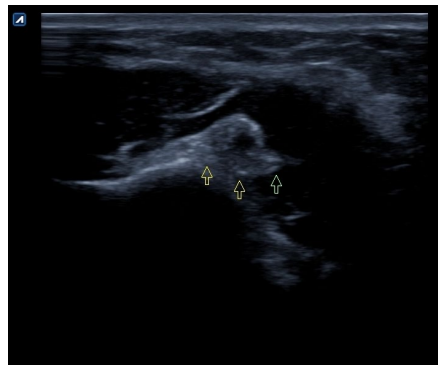
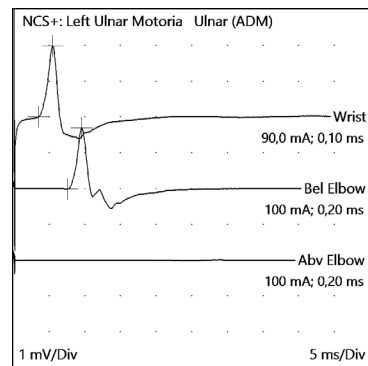


Figure 1  
Ulnar nerve compression

# Methods

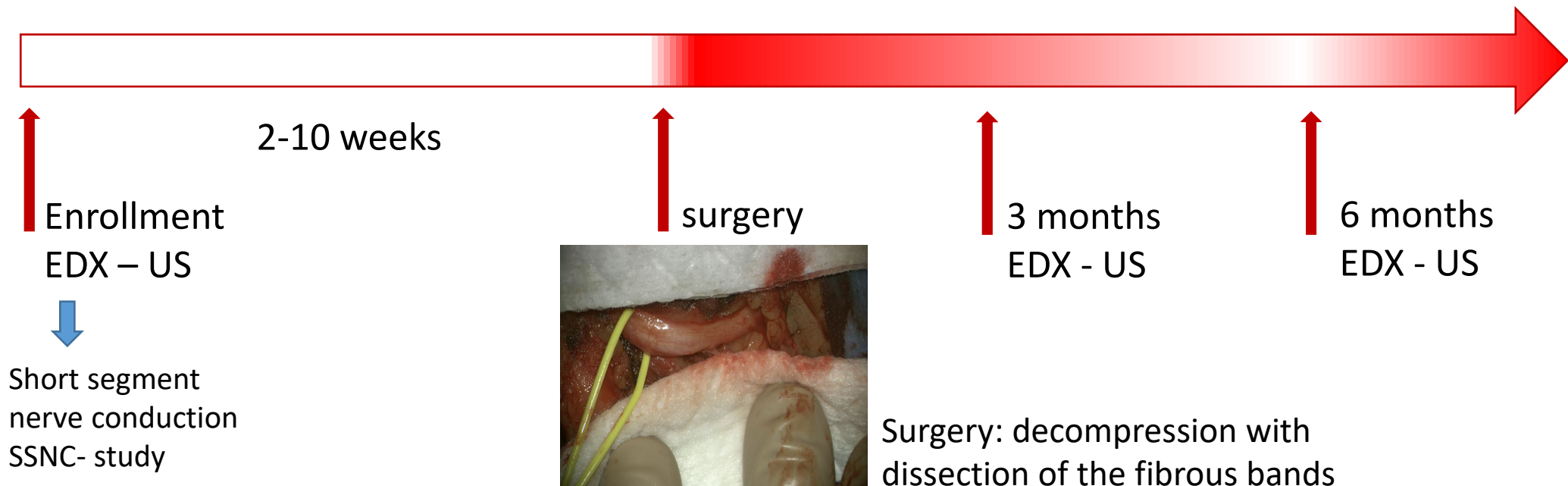
- We enrolled consecutive patients with common peroneal nerve entrapment (CPNE) at fibular head and ulnar nerve entrapment (UNE) at elbow.
- All underwent electrodiagnostic (EDX) and HF- Ultrasonography (12MHz), **bilaterally**.
- Using EDX, mononeuropathies was classified in subgroups with reduced motor nerve conduction velocity only (1), nerve conduction blocks (2) and prevalent axonal impairment (3).



- Pts with HNPP, other polyneuropathy were excluded

# Methods

- All patients performed clinical, EDX and US evaluation at baseline, 3 and 6 months.
- Only patients underwent surgery and with a mean follow-up of at least 6 months were considered for the analysis
- Patients that improved with medical and physical treatment underwent 3 months FU (no surgery)



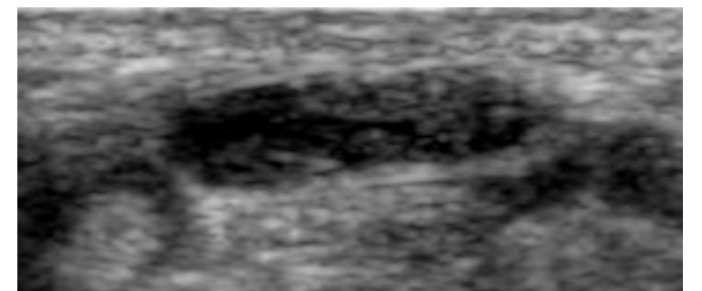
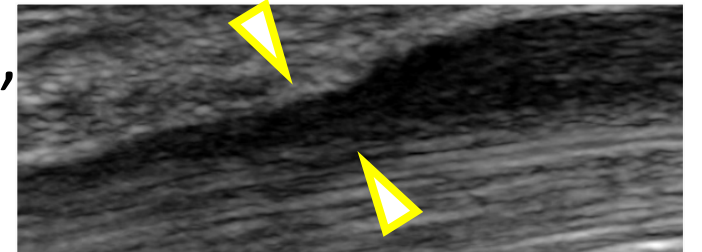
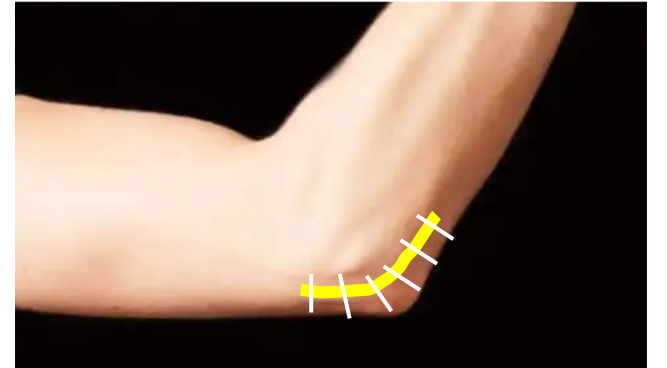
# Methods

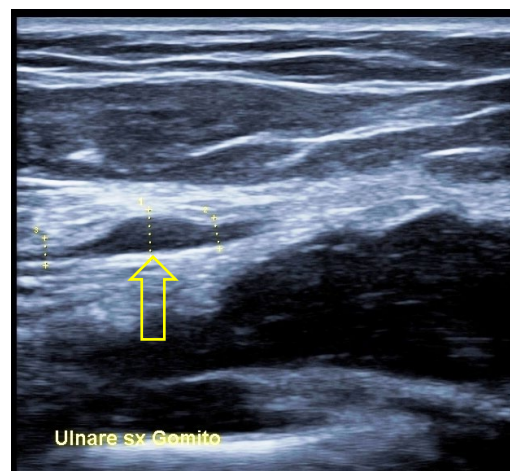
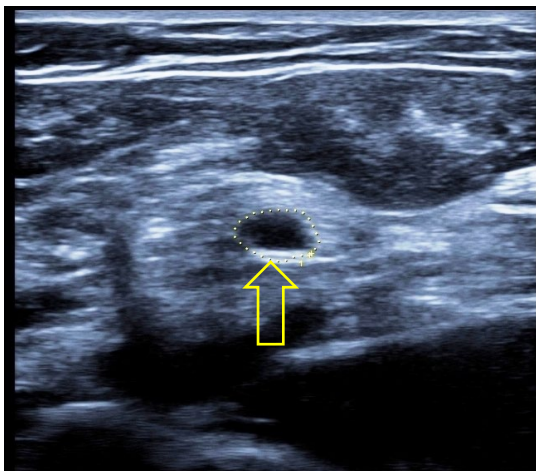
## US

In all ulnar and peroneal nerves studied, the following US-parameters were collected:

- maximal CSA,
- maximal/minimal CSA ratio,
- U-LANS \* (=Length of US-**abnormal** nerve segments),
- LMC ratio \* = LANS/Maximal CSA ratio.

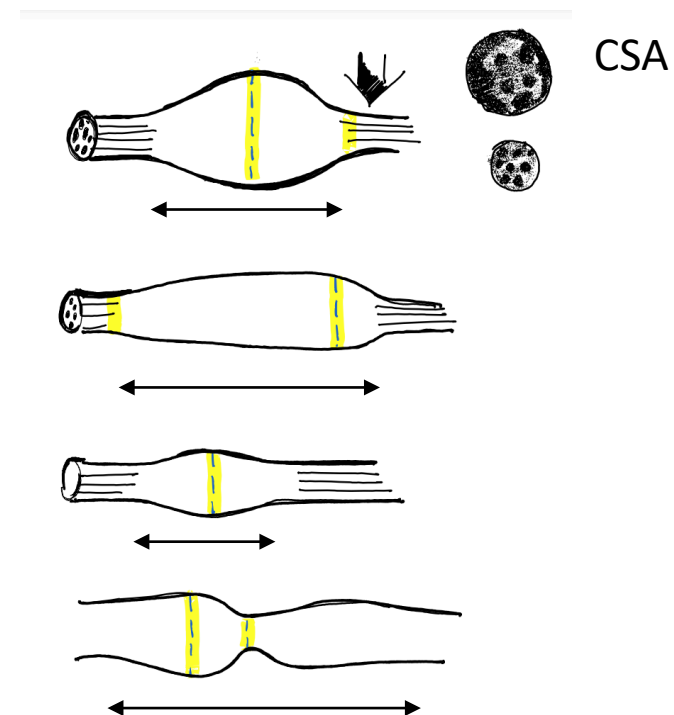
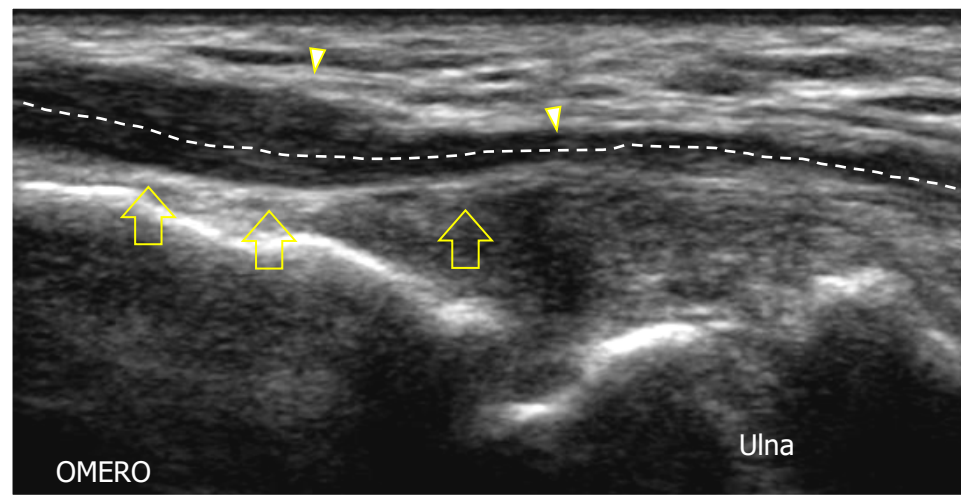
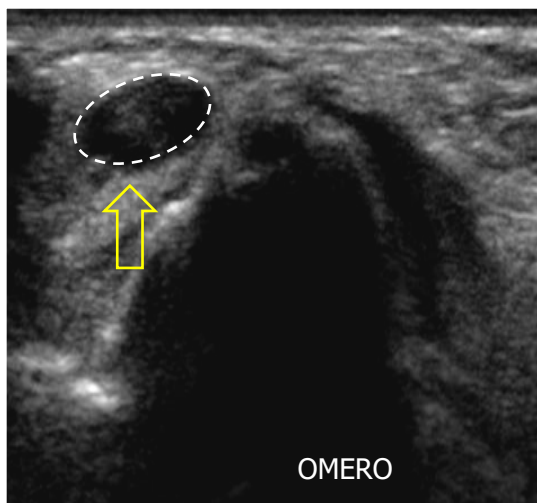
\* LANS determination was performed by US-software and ImageJ software





maximal CSA,  
maximal/minimal CSA ratio,  
u-LANS (=Length of abnormal nerve segments),

LMC ratio \* = LANS/Maximal CSA ratio.



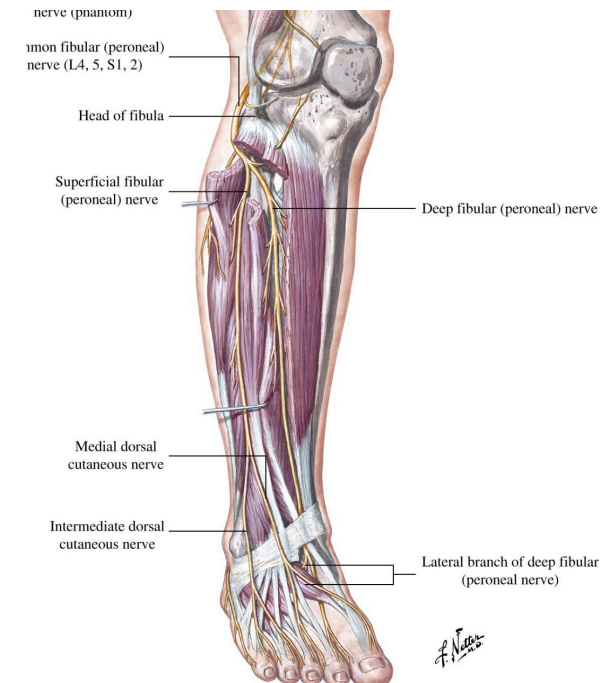


# Methods

Common peroneal nerve entrapment (CPNE) at fibular head

For CPNE, to evaluate the distal extension of nerve enlargement, the superficial and deep peroneal nerve were studied bilaterally and an additional parameter of **CSA side-to-side difference** was collected for both nerves.

If CPNE (and sup.peroneal nerve and/or deep peroneal nerve) were not clearly evaluable for US parameter determination, the case was excluded.





# Methods

## Outcome measures

### Clinical OM:

- % of improvement NRS (mean NRS last week)
- % reduction in pain paroxysms
- Global impression of change (7 items)
- MRC for motor, pin and cotton wool
- McGowan score (1= positive symptoms + hypoesthesia; 2= sensory loss and weakness; 3= severe sensorimotor deficit )

### Neurophysiological improvement at 6 months

- % cMAP improvement
- % increase NCV

### Global improvement score (Clinical signs + cMAP/MCV)

- 0= WORSE
- 1= NO CHANGE
- 2= MILD
- 3= SIGNIFICANT

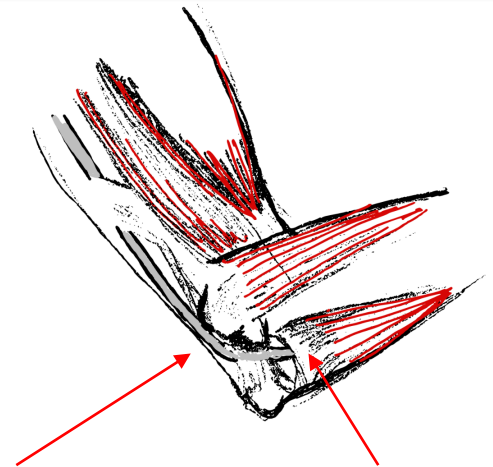
# Results

## Study population

### UNE

- In UNE group, the site of entrapment was at the Osborn's arcade in 24, at the medial epicondyle (ME) in 6 and at 2 cm proximal to the ME in 5.

UNE	Axonal	CB	Lower MCV	total
N	14	6	15	35
M/F	10/4	4/2	6/9	20/15
Symptoms duration (mean, Months)	18±8	9±3	15±5	-



Retrocondilar groove

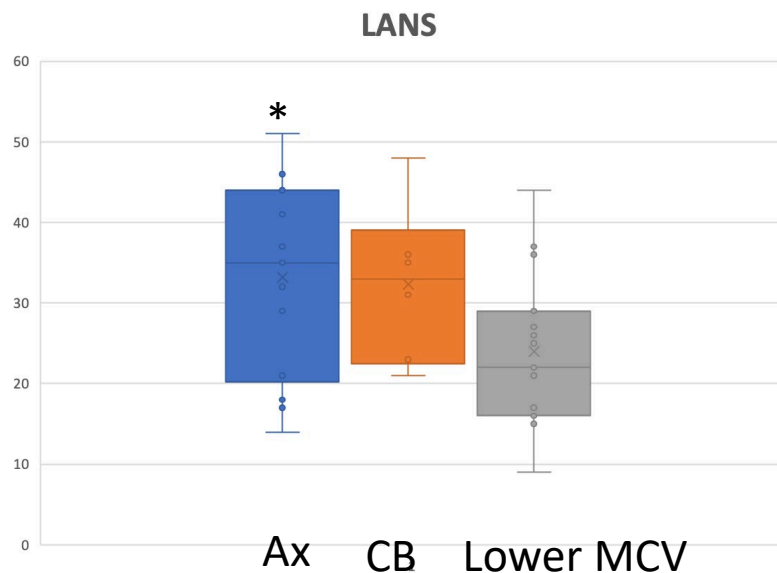
Distal to the ME  
*Osborn's arcade*

# Results

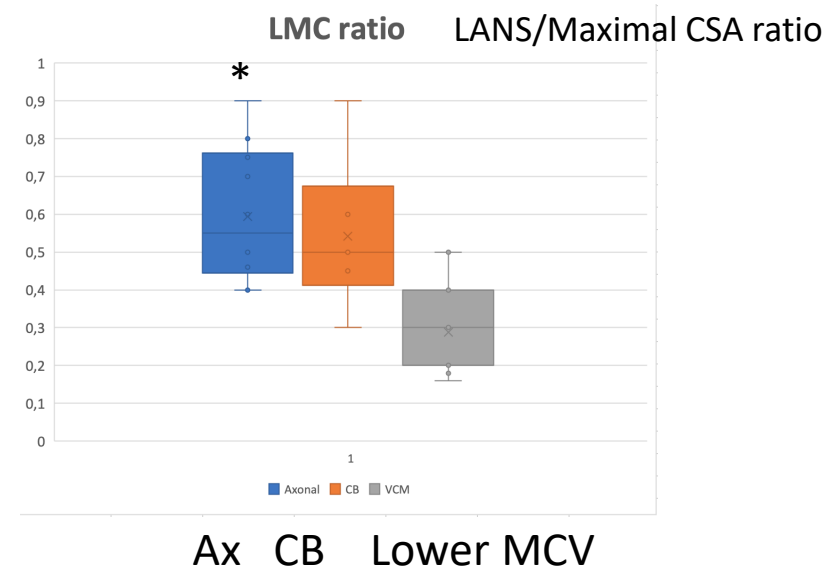
UNE

US - baseline

In axonal group the **u-LANS** was longer than in demyelinating entrapments ( $p=0.001$ ), and **maximal/minimal CSA ratio** was lower.

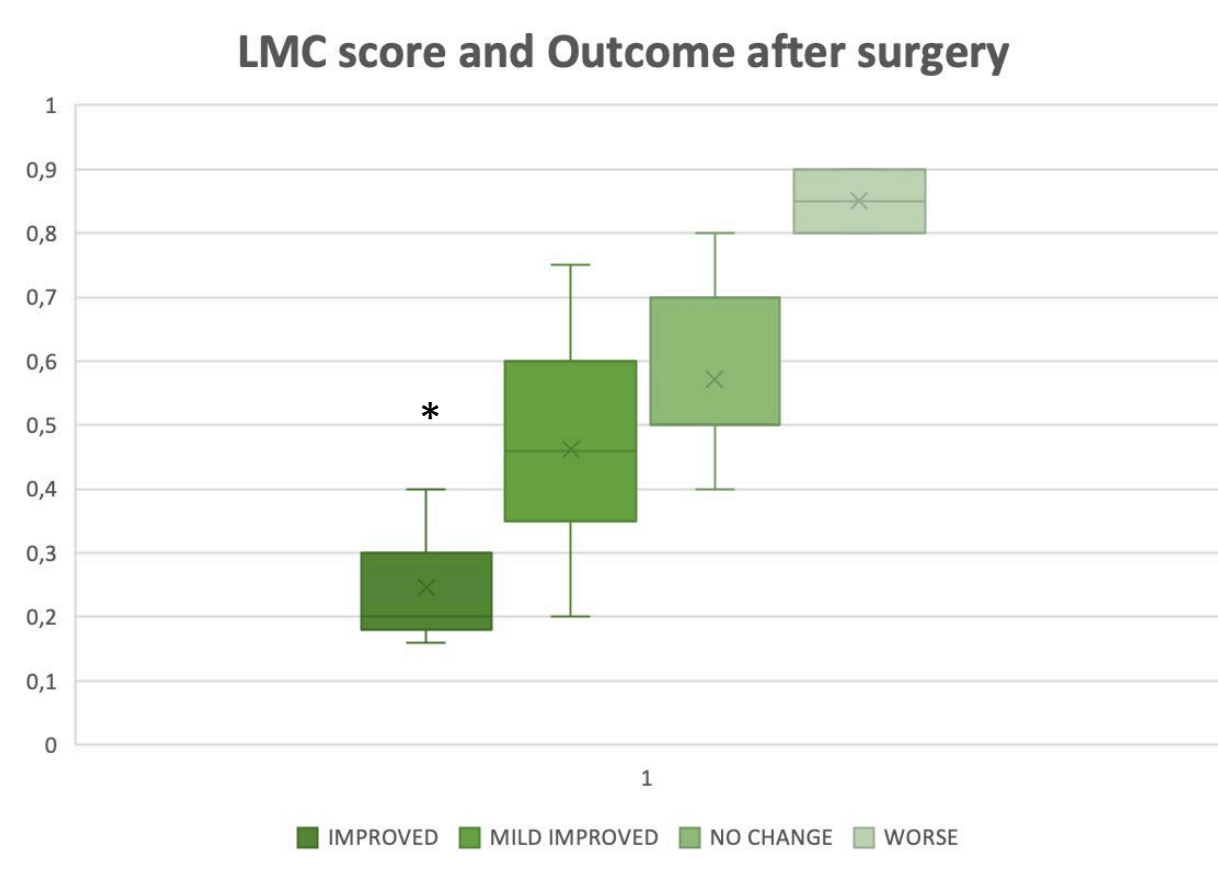


LMC>0.45



UNE

6-months

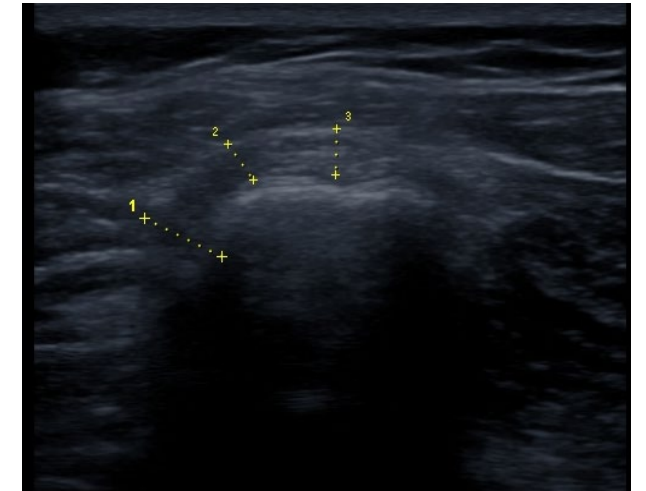


# Results

## CPNE

We enrolled also 52 patients with CPNE, in 12 the lesion was mainly axonal, in 34 we found CB and in 8 only increase of MCV.

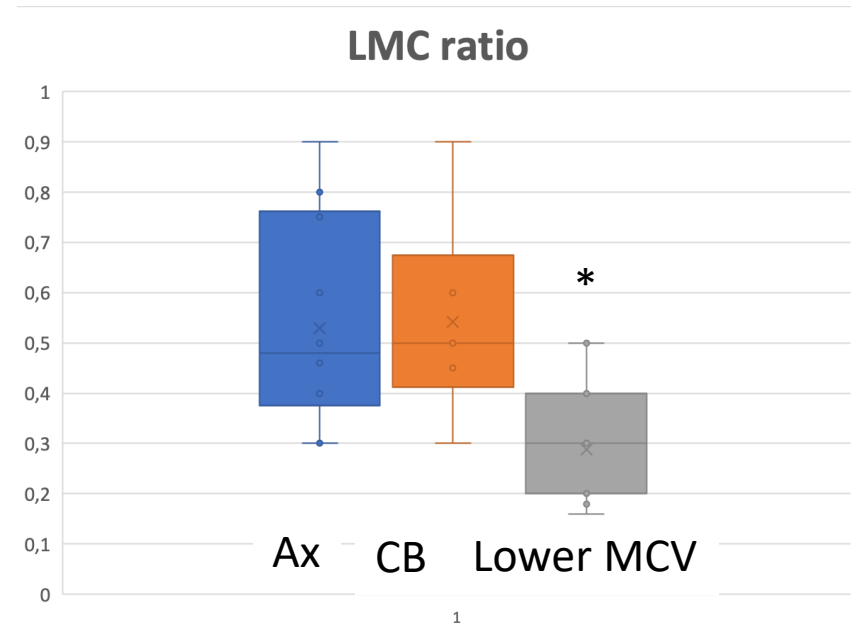
CPNE	Axonal	Increased MCV	CB	total
N	12	8	34	52
M/F	11/1	4/4	22/12	35/17
Symptoms duration (mean, Months)	18±9	13±7.5	10±5	-



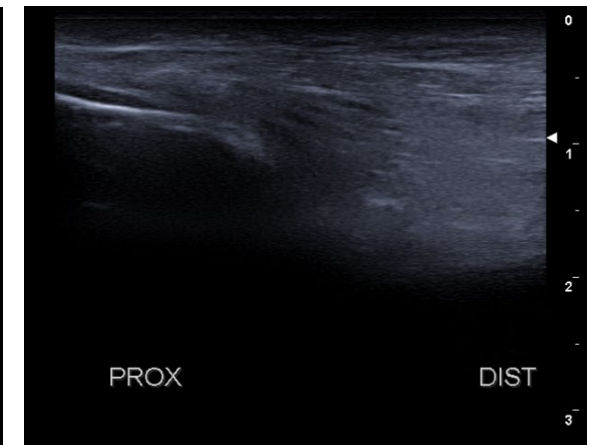
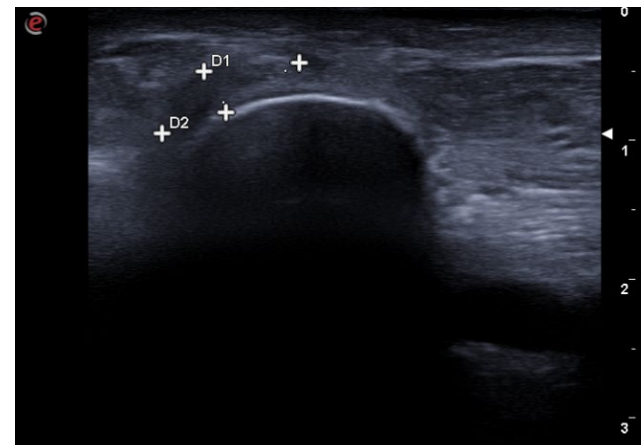
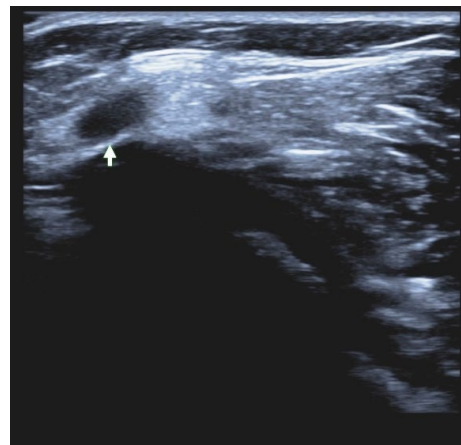
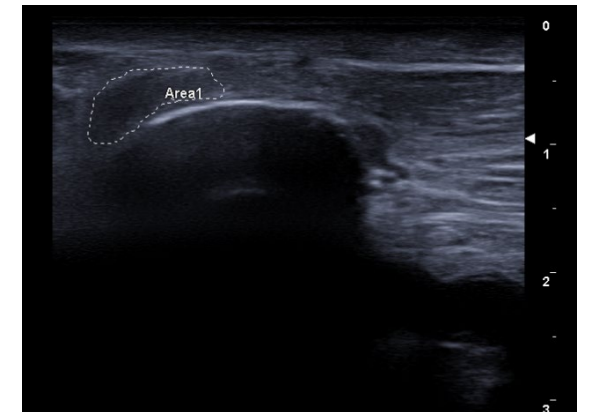
CPNE

US - baseline

LMC>0.45

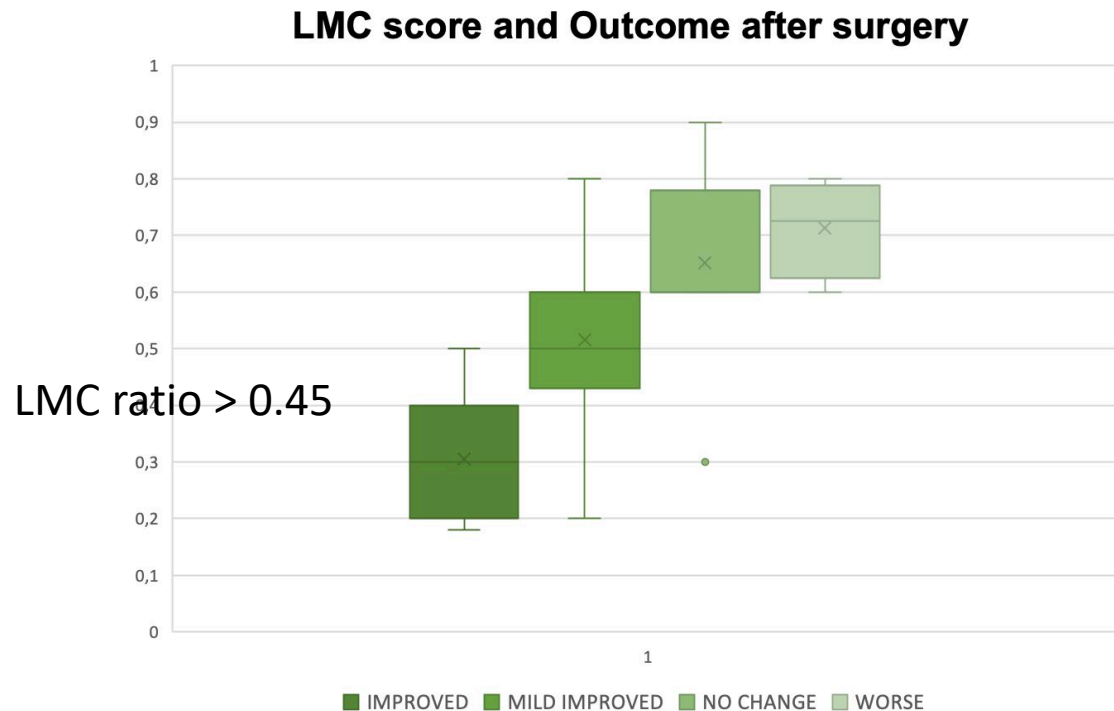


LANS/Maximal CSA ratio



# results

- In all groups shorter LANSs were related to a better clinical and EDX outcome, and the LMC ratio  $> 0.45$  is related to a worse outcome.



## At Follow-up

cMAP Amp	0-10%	20-40%	>40%
LMC ratio $> 0.45$	70%	30%	--
LMC ratio $< 0.45$	25%	75%	--



# results

Moreover, there was high concordance of pre-operative US studies with surgical view, and the pre-operative study allowed a tailored surgical plan.

# Conclusion

These preliminary results suggest the possible role of LANS and LCM ratio as ***additional*** predictive outcome for UNE and CPNE after surgery.



# grazie

**UO Neurologia 1 – Disordini del  
Movimento**  
**Roberto Eleopra**

Marta Corradi

Dipartimento Neuroscienze Cliniche  
Sara Rinaldo

**UO Neurologia 6 -Neurofisiologia  
Clinica**  
**Paola Lanteri**  
Mikael Izzo

Ramona Togni  
Valentina Catanzaro  
Ylenia Melillo  
Marta Corradi

**Dipartimento Neurochirurgia  
Neurochirurgia 3**

Vittoria Nazzi  
Ignazio Vetrano