

# COMMON ANATOMICAL NERVE VARIATIONS AND NERVE CONDUCTION STUDIES: MARTIN-GRUBER AND FIBULAR ACCESSORY NERVE ANASTOMOSIS AND ITS IMPLICATIONS

GARBINO JA, ALMEIDA JA, VITTI M

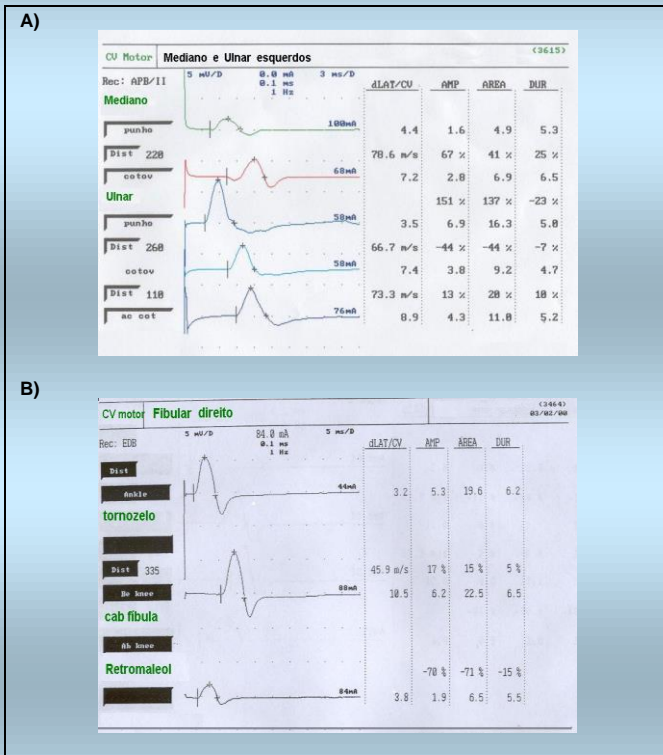
Research Institute Lauro de Souza Lima - Bauru - SP- Brazil [garbino.blv@terra.com.br](mailto:garbino.blv@terra.com.br), [www.ilsl.br](http://www.ilsl.br)

**1. Introduction:** The anatomical variations detected during motor nerve conduction, notably the Martin-Gruber (MG) and fibular accessory nerve (FA) anastomosis were studied. Detection frequencies mentioned in the literature range from 15 to 30% in anatomical and neurophysiological studies<sup>1,2</sup>. They are, therefore, relevant to clinical practice.

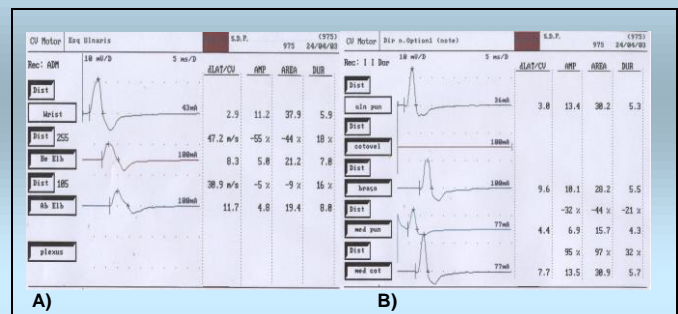
**2. Methods and results:** The study was neurophysiologically done on healthy individuals and anatomically on cadavers<sup>1,2</sup>. MG was studied in 64 adult healthy individuals, 15 females and 49 males, their ages ranged from 21-49 years. The FA was investigated in 100 adults, 45 females and 55 males, between 18-50 years. MG anastomosis was found 20/128 (15,6%) and FA was found 21/200 (10,5%). The anatomical study for MG was done in 40 forearms and FA in 42 lower limbs, both right and left, in human cadavers. MG was encountered 5/40 (12,5%) and FA 5/42 (11,9%), both in concordance with the neurophysiological findings, **Table 1**.

Anatomical variation	Neurophysiology data	Dissections data
<b>MG</b>	<b>20/128 (15,6%)</b>	<b>5/40 (12,5%)</b>
<b>FA</b>	<b>21/200 (10,5%)</b>	<b>5/42 (11,9%)</b>

**Table 1:** MG and FA variation frequencies in neurophysiological and anatomical studies, which were in concordance.



**Figure 1. A)** The median nerve traces 1 and 2, M wave in the *abd pol brevis* (APB) with initial positive deflection positiva inicial and CMAP reduced at the wrist and increased at elbow. Common finding in the MG anastomosis in routine studies. The traces 3, 4 and 5, recording in the *I interossei dorsalis* (II), the appropriate technic to studie MG. It is seen an amplitude decrement at elbow and amplitude CMAP recovered above, that's confirm the anastomosis. **B)** The CMAP in the *ext dig brevis* (EBD), peroneus nerve, traces 1 and 2, with reduced amplitude at the ankle and increased below knee at fibula's head. The third trace, when the stimulus where behind the external maleollus, at ankle, shows recovery of the CMAP amplitude, decreased at ankle (trace 1).



**Figure 2 A)** The motor nerve conduction study in a leprosy patient with chronic ulnar neuropathie, with reduction of velocity across the elbow and signs of conduction block below the medial epicondile. **B)** In the same patient, the test for MG recording in the *I interossei dorsalis* and stimulus in the ulnar nerve: at wrist with normal CMAP (trace 1), without response at elbow (trace 2) and normal above elbow (trace 3), though, excluding the hipotesis of conduction block. The median nerve, with reduced CMAP at wrist (trace 4) and normal CMAP at elbow (trace 5).

### 3. Clinical implications:

**3. 1. MG anastomosis:** a) Differentiate MG from a conduction block of the ulnar nerve around the elbow, in the presence of permanent reduced amplitude of the Compound Motor Action Potential (CMAP) around the elbow and above. b) Improve the understanding of the ulnar lesions around the elbow, i.e. in traumas with complete lesion though preserving part of the nerve function. c) Refute technical errors in conduction of the median nerve (when the CMAP in the elbow is higher than at wrist).

**3. 2. Fibular accessory anastomosis:** a) Refute technical errors in routine fibular conduction (when CMAP in the fibula's head is higher than in the ankle). b) Avoid contamination of the *extensor digitorum brevis* CMAP on sural nerve sensitive action potential (SAP) when the sural SAP was recorded on the lateral side of the foot. c) The anatomical findings of this study suggest that the risk of cutting the FA nerve during the sural nerve biopsy is a remote possibility because the FA is in a deeper tissue layer than the sural.

### 4. References:

- Almeida JA. Anatomical and electrophysiologic studies of the Martin-Gruber anastomosis. Master's monograph. Botucatu. Instituto de Biociências da Universidade Estadual Paulista; UNESP (1996)
- Almeida JA. Anatomical and electrophysiologic studies of the fibular accessory anastomosis. PhD's thesis. Botucatu. Instituto de Biociências da Universidade Estadual Paulista; UNESP (2001)