



Contents lists available at ScienceDirect

Autonomic Neuroscience: Basic and Clinical

journal homepage: www.elsevier.com/locate/autneu

Short communication

Sympathetic skin response. Glabella stimulation may be more useful than peripheral nerve stimulation in clinical practise[☆]Mauro Mondelli^{a,*}, Alessandro Aretini^a, Michele Ballerini^b, Benito Vecchiarelli^b, Alessandro Rossi^b^a EMG Service, Local Health Unit 7, Siena, Italy^b Dept. Neurological, Neurosurgical and Behavioural Sciences, Siena University, Italy

ARTICLE INFO

Article history:

Received 8 January 2011

Received in revised form 17 June 2011

Accepted 10 July 2011

Available online xxxx

Keywords:

Sympathetic skin response

Autonomic nervous system

Glabella stimulation

Neuropathy

ABSTRACT

The aim is to verify whether glabella electrical stimulation evokes sympathetic skin responses (SSR) without inter-side differences in latency and area of the responses and is more useful in mononeuropathies than peripheral nerve stimulation. SSRs were recorded in 25 healthy subjects from right palm, third (M3SSR) and fifth fingers and contralateral third finger. The inter-side differences of grand mean area and mean of largest area of M3SSR were significant only by ulnar nerve and not by glabella stimulation. Therefore glabella stimulation may be used in mononeuropathies comparing SSR area recorded from affected side with respect to contralateral healthy side.

© 2011 Elsevier B.V. All rights reserved.

1. Introduction

Sympathetic skin response (SSR) is the result of a complex polysynaptic reflex arc and represents a change of skin potential as a result of sudomotor activity. The deep inspiration, coughing, binaural click, burst, flash, electrical stimulation of a peripheral or cranial nerve, and magnetic stimulation at the level of C7 spinous process or of a peripheral nerve or brain are able to evoke the SSR. The most common method is to record the SSR by electrical stimulation of a peripheral nerve in the distal part of a limb.

The SSR has many limitations in the clinical routine because of inter- and intra-individual variability of latency and amplitude of the single responses and of the phenomenon of habituation that makes difficult to calculate the normative values of SSR parameters. Therefore, in common clinical practise, the SSR is considered impaired with certainty only if absent. Some reviews on the pathophysiology and clinical applications of SSR were recently published (Vetruigno et al., 2003; Kucera et al., 2004; Chroni et al., 2006).

If the stimulation of a common peripheral nerve is used, the responses recorded from the contralateral side to the stimulated nerve show amplitude lower than those recorded by the side of stimulation, probably due to a greater dispersion of excitation afferent arc (Montagna et al., 1985; Caccia et al., 1993; Vetruigno et al., 2003). To demonstrate the involvement of the sympathetic fibres in mononeuropathies, the comparison of parameters between the two sides could

eliminate the problem of obtaining the absolute reference values because the unaffected side may be used as an internal control, and then the ratio between the values of the two sides could be calculated. Thus a stimulus that does not produce significant differences in response parameters between the two sides should be used.

The aim of this study was to verify whether the electrical stimulation of the skin of the glabella can be used to obtain responses with similar parameters between the two sides of registration, compared to responses obtained with electrical stimulation of a common peripheral nerve of an upper limb.

2. Methods

Twenty-eight healthy volunteers with no history of systemic, neurological and endocrine diseases were recruited in the territorial electromyographic service of Local Health Unit no. 7 of Siena and at the Department of Neuroscience of the University of Siena, Italy. Three subjects (11%) did not complete the trial for the glabella stimulation because the electrical current applied to the glabella skin was considered painful even at low intensity (<20 mA). Therefore the results of this study relate to 25 subjects (15 women and 10 men, mean age 42.7 ± 14.1 , range 19–65 years).

The study of SSR was performed some days after the execution of standard neurography (nerve conduction velocity of the median, ulnar and radial nerves and of palmar branches) according to methods reported elsewhere (Mondelli et al., 2009). All subjects gave written informed consent.

SSR was recorded with the subjects lying in a bed in a quiet and warm room, asking to keep their eyes open to stay awake, not sighing, laughing, coughing or breathing deeply as possible. Their level of

[☆] The authors did not receive any grant support and do not have conflicts of interest.

* Corresponding author at: Servizio di EMG, ASL 7, Via Pian d'Ovile, 9, 53100 Siena, Italy. Tel.: +39 0577 535904; fax: +39 0577 535983.

E-mail address: m.mondelli@usl7.toscana.it (M. Mondelli).