

Unedited pathological recurrent association of palmomental and rooting archaic reflexes in a young woman with severe traumatic brain lesions – case presentation and physiopathological considerations

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Abstract

Introduction. Archaic reflexes are present in infancy, disappear as the brain matures, but reappear in pathological conditions. **Case report.** A 29-years-old woman has suffered a severe traumatic brain injury. She was admitted to neurorehabilitation 6 months after neurosurgical interventions (ventriculoperitoneal shunt for traumatic hydrocephalus, emerged after decompressive craniectomy). Neurological examination revealed a minimal conscious state, spastic tetraparesis, trismus, central facial palsy, nystagmus, bilateral palm-chin reflex, and a “mitigated” variant of the rooting reflex. The left corneal, snout and glabellar reflexes were absent. Osteotendinous reflexes were brisk, Babinski sign was bilaterally present, palmar and plantar grasp reflexes were absent. The trismus has persisted and chewing remained severely disabled after botulinum toxin injected in the left temporalis muscle and bilaterally in the masseter. The patient was fed by percutaneous endoscopic gastrostomy tube. Neurologic evolution remained stationary after two months of rehabilitative nursing. **Discussion.** The palmomental reflex described by Marinescu and Radovici, is elicited by scratching the thenar eminence of the palm, and consists of an ipsilateral twitch of the mentalis muscle. Baby rooting for milk is a primitive trigemino-facial reflex found in newborn infants. The lower lip is lowered, and the tongue is moved in the direction where the cheek near the corner of the mouth is brushed. The lockjaw has “mitigated” the classical pattern of clinical response. Repeated stimulation causes a unilateral mentalis muscle response, similar to the palm-chin reflex. The severe traumatic brain lesions have induced pathological reappearance of the palmomental and rooting archaic reflexes, in a unique, unedited pathological association.

Key words: *palmomental reflex (Marinescu Radovici reflex); rooting reflex; archaic reflexes; botulinum toxin; traumatic brain injury; minimal conscious state,*

Introduction

Primitive oral reflexes (rooting, snouting, pouting) are referred as archaic, developmental, atavistic reflexes, or "frontal release" signs. They are a group of pre-programmed behaviors, typically exhibited by normal infants in response to particular stimuli, and suppressed during normal development.

Baby rooting for milk (“reflexe des points cardinaux”) is a primitive oral trigemino-facial reflex, found in newborn infants and disappears at about the sixth week of life. The lower lip is lowered, and the tongue is moved in the direction where the cheek near the corner of the mouth is brushed.(1)

The palmomental reflex (PMR) is elicited by scratching the thenar eminence of the palm. It consists in a brief, involuntary contraction of mentalis muscles of the chin, usually unilateral and ipsilateral to the stimulated thenar eminence.(2) Mentalis muscle contraction might be weakly evoked (uni- or bilaterally) in some healthy subjects by means of a sufficiently strong mechanical stimulus or by electrophysiological

examination.(3,4) It seems that the electrically or clinically elicited contractions do not share the same mechanism of muscle responses.(4) A pathological PMR can be the only sign of suprasegmental lesions (2, 5-8) and may have the clinical semiotic significance as the extensor plantar response.(8)

Case report

A 29-years-old woman who suffered a severe traumatic brain injury was admitted to our neurorehabilitation clinic 6 months after neurosurgical interventions (ventriculoperitoneal shunt for traumatic hydrocephalus, emerged after decompressive craniectomy).

Neurological examination revealed a minimal conscious state, spastic tetraparesis, neurogenic bladder, trismus, central facial palsy more evident in the expressive mimic, nystagmus, bilateral palm-chin reflex (fig.1 A,B), and a “mitigated” variant of rooting reflex (fig.1 C,D).

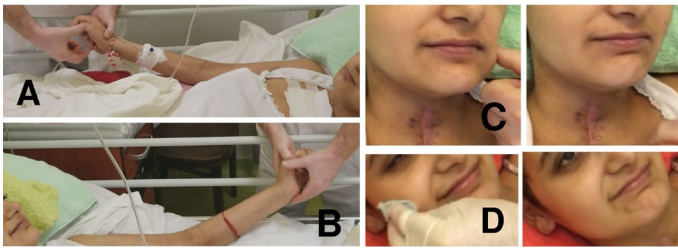


Fig.1 (A, B) Bilateral palmomental reflex: stroking the palm of the hand while watching for the contraction of the ipsilateral mentalis muscle (A: right PMR; B: left PMR) (C, D) Clinical variant of the rooting reflex. Repeatedly cheek stimulation with the finger drawn across the mid-cheek towards the corner of the mouth, elicited an ipsilateral visible wrinkling of the skin over the chin, and slightly elevation of the corner of the mouth, similar to the palm-chin reflex (C: left; D: right)

The left corneal, snout and glabellar reflexes were absent.

Osteotendinous reflexes were brisk (+3/right, +4/left side), Babinski sign was bilaterally present, palmar and plantar grasp reflexes were absent.

Assessing facial anatomical features incidentally revealed contractions of the mentalis muscle, occurring whenever a moderate pressure tactile stimulus was applied to the cheek, beside the mouth. The visible, not exhausted chin twitch was ipsilateral to the stimulated midface, and clinically similar to the PMR.

Conventional MRI (1.5T) was not sufficiently informative to show in detail all the tiny, diffuse brain damage (fig.2).

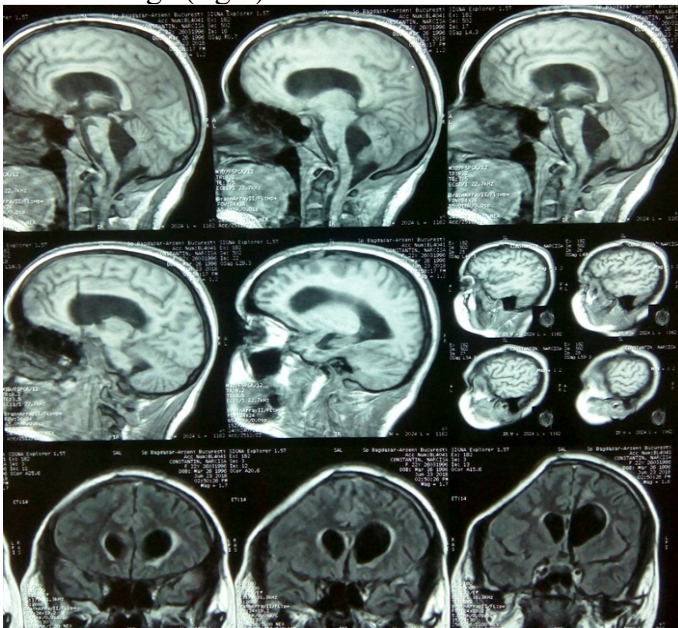


Fig.2 MRI scan. T1- sagittal sections (up) and coronal section (bottom): craniectomy, posttraumatic hydrocephalus, and ventriculoperitoneal shunt.

A synergistic combination of neurotrophic factors and vitamins was associated with systematic passive physiotherapy and joint mobilization with a robotic assistive device.

A total doze of 500 U of Botulinum toxin was safely injected in the left temporalis muscle, and bilaterally in the masseter muscle. Passive and active opening of the mouth remained severely disabled after toxin administration. Neither PMR nor the clinical variant of the rooting reflex was clinically influenced by the spasmolytic agent.

Neurologic status remained stationary after two months of rehabilitative nursing program. The subject was discharged with indications to be fed by the gastrostomy tube. *Ad functionem* outcome remained poor, and *ad vitam* prognosis uncertain.

Discussion

Pathological reappearance of the archaic palmo-mental and rooting reflexes, re-emerged in a young woman with significant bilateral brain dysfunction is, to our best of knowledge, a unique, unedited aspect. This clinical case reflects the severe cortical inhibitory pathway disruptions and imbalance of the excitatory and inhibitory influences on the facial motor neurons, respectively on the trigemino-facial interconnected neuronal circuits.(5,6)

Gheorge Marinescu was one of the most remarkable neuroscientists of the last century, founder of the Romanian school of neurology. He realized the first scientific application of cinematography in medicine (1898-1901), and described the palm-chin reflex, useful in clinical roundsmanship, as a sensitive marker for severe neurological impairments.(2,5-8)

The polysynaptic PMR is served by neuronal circuits extending from the lower cervical spinal cord to the facial motor nucleus localized in the lower pons. (4,6) Its afferent sensitive pathway is represented by the median nerve and conducted through C6-C7 roots of the cervical plexus. The complex volley of intrasegmental impulses reaches facial motor nuclei either through short-(paucisynaptic) or long-loop (thalamocortical) circuits.(4) The efferent pathway involves the motor nuclei and branches of the facial nerve.

In normal adulthood conditions PMR is highly suppressed (as other local reflexes) by suprasegmental control. Habituation (extinction of the muscular response) is more frequent in healthy controls than in other different patients groups, and represents the most important clinical discriminating

aspect between the physiological or pathological reflex.(4,8)

The exaggerated stimulus response, on occasion differing on each side, under routine stimulus is pathologic.(2,5-8) Strong, sustained, easily repeatable contractions of the mentalis muscles, elicited by mechanical or electrical stimulation of a much wider receptive area (other than the palm) indicate cerebral (especially frontal lobe) damage.(2,5-8)

The lockjaw has “mitigated” the stereotype clinical pattern of the archaic trigemino-facial rooting reflex (reveled in newborn baby). Botulinum toxin had no effect on the inexhaustible, easily repeatable twitching of the mentalis muscle, or on the possibility for either passive or active opening of the mouth.

The association of these two archaic reflexes brings a supplementary clinical argument to reinforce the supposition that PMR is co-occurring in the general feeding behaviour, rather than being only a primitive reflex involving the mentalis muscle.(9) In newborn baby palmomental and rooting reflexes might represent “pieces of puzzle” in the complex interaction between the hand and mouth, integrated in the concept of grabbing, bringing the nutrient to the mouth, mouth opening, chewing and swallowing. Neural circuits located within the brainstem and spinal cord provide the morphological and functional substrate for transmitting and coordinating sensory inputs to motor outputs, responsible for orofacial behaviors.

Feeding, driven by central circuits (pattern generators), implies coordinated activity of multiple groups of motoneurons that control jaw-tongue-facial muscle targets. These vital behaviors are based on complex neuronal circuits with several interneurons, but also on simple functional reflex circuitry, with only three to four neurons.(10)

The classical somatotopic and laminar organization of the afferents from the peripheral orofacial receptive fields corresponds to a somatotopic map in the trigeminocervical complex, situated in the medullary and lamina V of the upper cervical dorsal horn. This topographic region is essential for the orofacial behaviors, because it appropriately links to the facial motor nuclei, and corresponds to their musculotopy pattern.

Compliance with Ethical Standards

The author discloses any potential conflicts of interest.

Written informed consent has been obtained from the patient’s next of kin (mother) to the inclusion of material pertaining to the case.

Institutional consent for publication was obtained from our Hospital Ethic Commission.

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