



Current Concepts in Physiatric Pain Management

Assessment and Management of Pain in Patients With Disorders of Consciousness

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Abstract

Pain is a first-person experience that must be reported, verbally or nonverbally, to be correctly assessed. How, then, is pain perception determined in persons who are noncommunicative? This determination is a major clinical challenge because patients with disorders of consciousness are unable to communicate their feelings and possible pain experiences. This review will describe the current knowledge of evaluating pain perception in a minimally conscious state compared with an unconscious state (also known as vegetative state/unresponsive wakefulness syndrome) and how to approach the management of pain in these 2 populations.

Introduction

Pain is defined as “an unpleasant sensory and emotional experience associated with real or potential tissue damage” [1], whereas nociception is described as “an actually or potentially tissue damaging event transduced and encoded by nociceptors” and may lead to “nociceptive pain” (in contrast with neuropathic pain, which arises from damage to neural tissue) [2]. Nociception hence refers to the basic processing of a noxious stimulus. It is necessary to pain perception, but it will not always lead to a conscious experience [2]. In contrast, pain is a first-person experience that must be reported, verbally or nonverbally, to be correctly assessed.

How, then, is pain perception determined in persons who are noncommunicative? This determination is a major clinical challenge because patients with disorders of consciousness (DOCs) are unable to communicate their feelings and possible pain experiences. According to the International Association for the Study of Pain, the inability to communicate verbally does not exclude the possibility that a person is experiencing pain and needs appropriate pain-relieving treatment [1], underlining the necessity to better understand pain perception in these patients. With both advances in survival and neuroimaging after brain injury, the number of publications on patients recovering from coma has

continued to increase. Lately, authors of a growing number of studies have investigated pain perception and assessment in patients with severe brain injury and altered consciousness. This review will describe the current knowledge of evaluating pain perception in a minimally conscious state (MCS) compared with an unconscious state (also known as vegetative state/unresponsive wakefulness syndrome [VS/UWS]) and how to approach the management of pain in these 2 populations.

Clinical Definition and Neuroimaging Correlates of Minimally Conscious State Versus Vegetative State/Unresponsive Wakefulness Syndrome

Minimally Conscious State

In 2002, MCS was defined by the Aspen Workgroup as the presence of inconsistent but clearly discernible behavioral signs of consciousness [3]. Patients evolving from a VS/UWS to an MCS are awake but also start to show simple oriented behaviors such as visual pursuit. Signs of consciousness in patients in an MCS may be difficult to observe because they are inconsistent in time as a result of high fluctuations in vigilance. Signs of consciousness nevertheless must be replicated within a given examination to meet the diagnostic criteria for an MCS. Later, those patients also may start to present

more complex willful responses, such as responses to commands (eg, “shake my hand”), showing that they understand language. The recovery from an MCS is defined by the re-emergence of functional communication and/or functional objects use [3].

With regard to pain perception, Boly et al [4] reported brain activation similar to that of control subjects in response to noxious stimuli encompassing not only the midbrain, thalamus, and S1 but also S2 and the insular, posterior parietal, and posterior part of the anterior cingulate cortex (ACC). The activation of these areas, particularly the ACC and insula, suggests that patients in an MCS may perceive the unpleasant aspect of painful stimuli [5,6]. Moreover, intact connectivity between primary and associative cortices also has been observed in these patients, suggesting the existence of an integrated and distributed neural processing that makes plausible the existence of conscious pain perception in this population (see Figure 1).

Vegetative State/Unresponsive Wakefulness Syndrome

In 1972, the term *vegetative state* was first introduced by Jennet and Plum to describe “an organic body capable of growth and development but devoid of sensation and thought” [7]. Patients in a VS open their eyes spontaneously or in response to stimulation and present preserved autonomic functions (eg, cardiovascular regulation and thermoregulation), but they are not conscious and show only reflexive behaviors [8]. The return of eye opening does not reflect recovery of the sleep-wake cycle because recent findings have shown no electroencephalographic changes and no common stages of sleep (such as slow wave sleep or rapid eye movements) during prolonged periods with the eyes closed in patients who are in a VS [9]. When this state lasts 1 month or more, the term *persistent vegetative state* may be applied. When recovery does not occur after a specified period (ie, 3 months for persons with

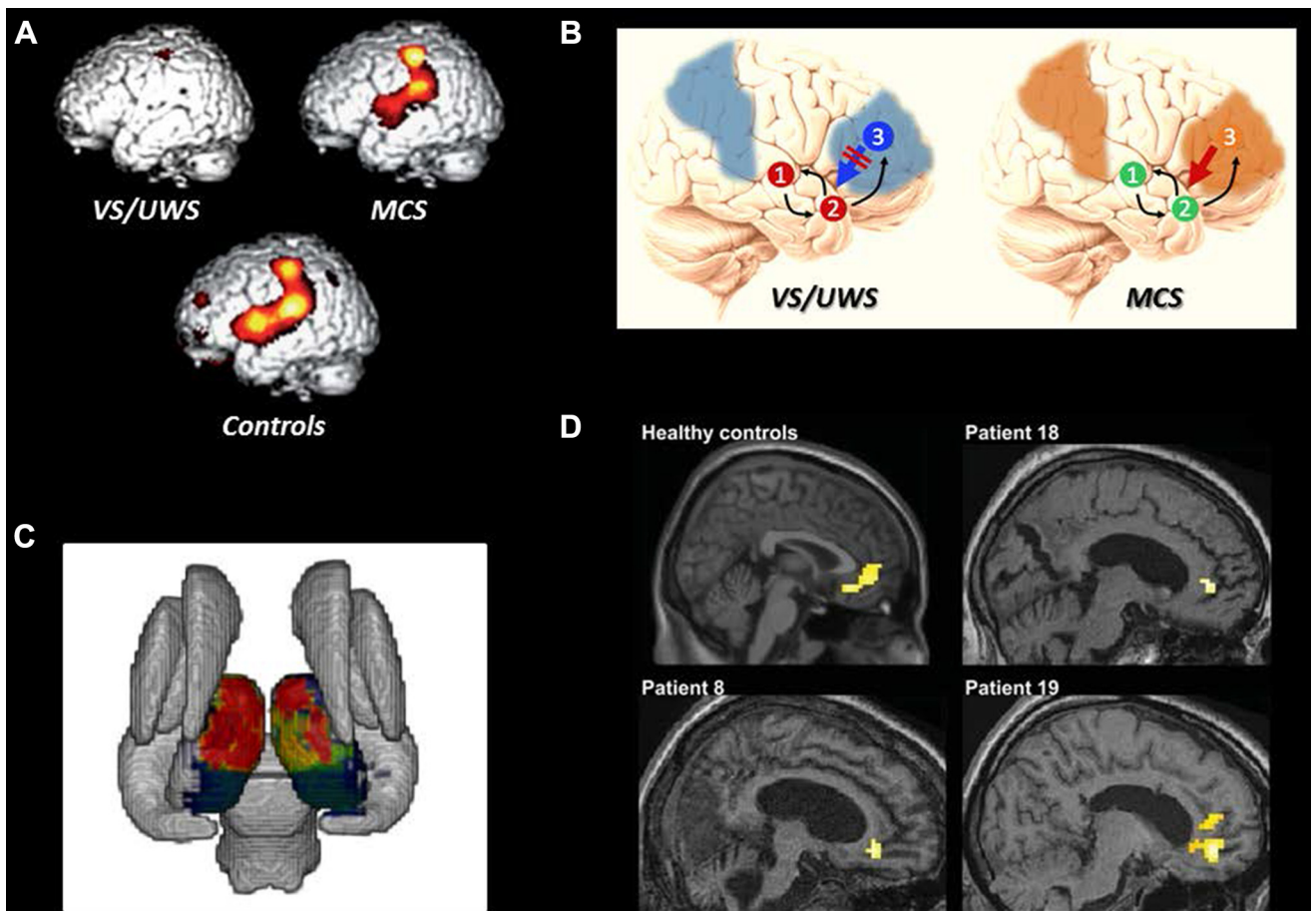


Figure 1. Cerebral activation in patients in a vegetative state/unresponsive wakefulness syndrome (VS/UWS) and in a minimally conscious state (MCS) compared with healthy control subjects. (A) Yellow/red areas illustrate brain regions that are activated during noxious stimulation in healthy control subjects, in patients in an MCS, and in patients in a VS/UWS [4,11]. (B) The deficit in connectivity (particularly, long distance backward connectivity) in patients in a VS/UWS versus patients in an MCS [12]. 1 = primary auditory cortex; 2 = superior temporal gyrus; 3 = inferior frontal gyrus. (C) The thalamic atrophy linked to patients’ outcome at 6 months after injury [14]. (D) The unusual activation of the anterior cingulate cortex in response to noxious stimulation in several patients diagnosed as being in a VS/UWS [18]. Used with permission.

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