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Chronic Pains Associated with Positive and Negative Sensory, Motor, and Vasomotor Manifestations: CPSMV (RSD;CRPS?). Heterogeneous Somatic Versus Psychopathologic Origins

■ Patients complaining of chronic pains associated with assorted positive or negative sensory, motor, and vasomotor symptoms or signs may harbor any variety of legitimate primary diseases of the soma or the psyche and may also be malingerers. Regrettably, these patients are typically misperceived as constituting a homogeneous population in terms of their pathogenesis and continue to be labeled with any of several quasiequivalent traditional terms, such as causalgia, reflex sympathetic dystrophy, sympathetically maintained pains, algodystrophy, CRPS or neuropathic pains. These terms foster the false assumption that the mechanistic basis of the symptom complex is understood, solitary, and unique. Such fallacy breeds mismanagement and iatrogenesis. A proper understanding of these patients first requires the cancellation of those diagnostic terms that misleadingly imply specific causality. Next, it is essential that both clinician and scientist become aware that CPSMV patients represent a heterogeneous group whose differential diagnosis is usually bypassed; and that, often, the primary mechanism leading to chronic pain and the associated psychophysical sensory, motor, and even objective vasomotor manifestations is psychogenic. ■

Key Words: Pain, Neuropathy, Pseudoneuropathy, RSD, Pseudoscience, Somatization, Iatrogenesis

INTRODUCTION

Patients with CPSMV (Ochoa, 1993) often receive a flawed diagnosis. The somatosensory, somatomotor, and vasomotor clinical manifestations usually associated with chronic pain in CPSMV patients are, by nature, neurologic, and therefore call for specialized history and physical evaluation of the nervous system. Moreover, the laboratory testing required to determine the actual source of those manifestations must address neurophysiologic parameters. These elementary requirements for proper identification of a pathophysiologic basis for CPSMV are too often not observed. Typically, CPSMV patients assessed by clinicians go without the benefit of formal neurologic evaluation. Some of the "gold standard" diagnostic tests used for differential diagnosis rely weakly on subjective reports from the patients. Many patients express substantial relief of the pain, muscle weakness, spasms, or sensory loss following medical interventions pursued with a diagnostic intent. These include somatic nerve blocks, selective sympathetic blocks, the application of skin patches or stimulators, or a simple inert ritual. It is clear that, to a major extent, the subjective and psychophysical effects of such interventions are due to the placebo phenomenon (Verdugo and Ochoa, 1994). Necessary placebo control for these interventions is usually not implemented because the clinician is either unaware of its high prevalence or mistakenly believes that it might be unethical (Ochoa, 1995).

The signs and symptoms collectively referred to as CPSMV are nonspecific and reflect a heterogeneous variety of medical entities. Chronic pains in CPSMV patients originate from any of several distinct primary health disorders that might be due to a variety of etiologies. Clear understanding of the diverse causes and types of CPSMV is essential for scientifically rational clinical and laboratory investigation of the whole spectrum of neurologic and psychiatric disorders that may underlie the condition (Ochoa, 1993, 1997; See also Mailis, 1995).

My strong contention is that many CPMSV patients experience pain emanating from a primary psychopathologic origin rather than a neuropathologic origin. The psychogenesis is usually through conversion-somatization, a phenomenon understood as unconscious attempts to relieve intolerable stress through the development of somatic symptoms (Cheyne, 1733; Hart, 1979; Lipowski, 1988; Ron, 1994; Ford, 1995). Characteristically, these symptoms are related to and under the potential influence of brain function: somatomotor, vasomotor, somatosensory, or the special senses. When these patients are not properly typified through rigorous differential neurologic diagnosis, they are harmed by omission of

accurate diagnosis and treatment and by commission of unnecessary and sometimes harmful medical interventions (Ron, 1994; Ochoa, 1996). This group of psychopathologic (“neuropathic pain”) patients also includes the illegitimate conscious malingerers and individuals with Münchhausen’s syndrome (Faust, 1995; Folks, 1995). A critique of dogmas promulgated through the book *Reflex Sympathetic Dystrophy: a Reappraisal*, edited by Jänig and Stanton Hicks, was recently reviewed for the journal *Brain*. The reviewer emphasized the misunderstanding of reflex sympathetic dystrophy (RSD) and pointed the finger at the subterfuge of its new taxonomic disguise: “complex regional painful syndrome” (CRPS), the inevitable iatrogenesis generated by such a diagnostic term, the placebo artifact incurred in diagnostic blocks, and the fallacy of automatically adjudicating to physical suffering the psychiatric dysfunction commonly associated with RSD.

RANGE OF PRIMARY NEUROPATHOPHYSIOLOGIC AND PSYCHOPATHOPHYSIOLOGIC DISORDERS UNDERLYING CPSMV

Mechanisms:

For positive and negative sensory phenomena inclusive of the pain complaint, the primary abnormal mechanism of CPSMV may reside in the somatosensory apparatus anywhere between peripheral receptor and the brainmind. For the positive and negative motor phenomena, the mechanism may reside anywhere between brainmind and striated muscle.

Listed below are a spectrum of abnormal mechanisms that might potentially produce symptoms of CPSMV:

1. Sensitization of primary nociceptor nerve endings (reduced threshold or exaggerated receptor response) (Perl et al, 1976; Lewis, 1936; Ochoa, 1986). Stimuli that normally do not evoke pain may now do so.
2. Ectopic nerve-impulse generation in midaxon of primary nociceptors. Spontaneous or mechanosensitive local discharge or multiplication of afferent volleys (Adrian, 1930; Wall and Gutnick, 1974; Rasminsky, 1978. See also Culp and Ochoa, 1982). This mechanism can produce pain when the site of nerve hyperexcitability is disturbed mechanically. Spontaneous ongoing pain may also develop from this mechanism.
3. Release of primary nociceptor input due to defective coactivation of modulatory nonnociceptor input. When one component of

the afferent blend evoked by natural stimuli is weak, the potential painful component may become disinhibited (Yarnitsky and Ochoa, 1990b; Ochoa and Yarnitsky, 1994).

4. Sympathetic dependent excitation of nerve fibers of primary nociceptor afferents (Sato and Perl, 1993). In this hypothetical condition, catecholamines might activate the pain-evoking nerve fibers.
5. Secondary sensitization of central pain-signalling neurons induced by a massive primary afferent barrage caused by damage to nerves or to innervated tissues (Evans, 1946; Roberts, 1986). With persistent secondary sensitization, subsequent afferent traffic, even along nonnociceptor units impinging on those central neurons, would hypothetically evoke pain.
6. Sympathetic-dependent excitation of primary nonnociceptor units whose input would drive a secondary sensitization mechanism (see number 5) (Roberts, 1986). In the mid-1980s, this complex hypothetical loop superceded prior hypotheses, which were subsequently updated (Campbell et al, 1992, 1993).
7. Psychiatric conversion/somatization pain disorder (Engel, 1959; Weintraub, 1995). The complaints of pain in the somatic domain may be due to primary psychopathology (Derbyshire et al, 1994).
8. Münchhausen’s syndrome (Folks, 1995; Ford, 1996). In this unusual psychiatric disorder individuals self-inflict disease and may complain of CPSMV even without an organic somatosensory basis.
9. Malingering. Falsification of disease in pursuit of material gain is not rare in the litigation/compensation setting. Malingerers who choose the chronic postinjury-pain scenario logically report associated motor and sensory symptoms (Weintraub, 1995).

Except for the last two disorders, Münchhausen’s and malingering, these conditions have been proven capable of occurring in animal experimental states inclusive of hysterical conversion (Pavlov, 1928). In human CPSMV patients, each of these basic conditions has been shown to occur, with three exceptions: sympathetic-dependent excitation of primary nociceptors; sympathetic, neurotransmitter-dependent excitation of primary low-threshold receptors; and secondary sensitization of central pain-signalling neurons. A broad variety of primary *etiologic* conditions can cause the neuropathophysiologic defects associated with organic nerve dysfunction.

DISCRETE CLINICAL AND PATHOPHYSIOLOGIC ENTITIES UNDERLYING CPSMV

Painful Mononeuropathy

Organic nerve pathology—traumatic, toxic, neoplastic, inflammatory, or genetic—can give rise to CPSMV. Nerve pathology can produce anything from full-blown CPSMV to a monosymptomatic clinical profile. Actual organic diseases of nerve trunks can also be completely asymptomatic; yet, as our technical ability to detect such disorders improves, so does the likelihood of erroneously attributing the CPSMV to a detected transmission defect. This pitfall (Gilliatt, 1978) has become a substantial source of misdiagnosis and iatrogenic injury in the realm of CPSMV and chronic nerve entrapment (Ochoa, 1993; Ochoa et al, 1994).

Examples are given below of bona-fide painful organic mononeuropathy as contrasted with misdiagnosed pseudoneuropathy.

Gross Traumatic Median-Nerve Lesion Causing CPSMV

First Episode: A male patient, Mr. J, suffered an intraarticular fracture of the distal right radius complicated by a syndrome of CPSMV that featured weakness, atrophy, and electromyographic signs of partial denervation in the intrinsic hand muscles supplied by the median nerve. Symptoms included hypoesthesia, loss of median sensory-nerve action potentials, and abnormally increased thresholds for warm and cold sensations in median-nerve skin. The right hand was diffusely cold by thermography. He described brief, paroxysmal spontaneous and electric-like shooting pains projecting down to median-nerve territory in addition to moderate ongoing spontaneous pain, probably originating from the joint. He also had unpleasant dynamic mechanical hyperalgesia (“brush-induced” or “low-threshold mechanoreceptor (LTM) mediated allodynia”) strictly confined to median-nerve territory, matching the area of hypoesthesia. There was no thermal hyperalgesia. The mechanical hyperalgesia disappeared during selective A-fiber block induced through compression ischemia. Inert-substance (placebo) injection near the site of maximal symptoms caused no significant improvement of the hyperalgesia. Local lidocaine block of the median nerve at elbow level abolished hyperalgesia by completely anesthetizing the skin supplied by the injured median nerve. The residue of voluntary median-motor function, as well as the sign of Tinel, disappeared transiently. No symptoms or signs were present beyond median territory, either before or during diagnostic nerve block. The hypothermic skin of the hand warmed up partially during anesthetic median-nerve block, indicating vasospasm associated

with partial sympathetic denervation supersensitivity. A physiologically effective right-stellate ganglion block did not even minimally relieve spontaneous pains. On the contrary, during sympathetic block the mechanical hyperalgesia of the median palm worsened significantly and was reversibly abolished through passive cooling of the hand.

The patient’s positive and negative motor, sensory, and vasomotor manifestations improved partially with time, in keeping with the natural history of an acute axonal nerve lesion in continuity (Seddon 1943). A few years later, his steady neuromuscular status switched dramatically. His classic causalgia blew up into a reflex sympathetic dystrophy (RSD) profile by IASP criteria (IASP, 1986).

Comment

This patient, who had a known mechanical median-nerve injury, displayed typical sensory, motor, and vasomotor symptoms associated with mixed somatic-nerve injury. There were no extraterritorial sensory, motor, or vasomotor manifestations (Bennett, 1994; Tal and Bennett, 1994; Ochoa and Verdugo, 1995). Clinical evolution toward recovery also followed the anticipated course. He was fortunate that the vasomotor component of his mononeuropathy was not misconstrued as a sympathetic cause for his pains. This patient could have been well-evaluated purely on clinical grounds, without the need of refined laboratory testing, not even routine electrodiagnostic testing. Seasoned wartime surgeons would have made a spot diagnosis, recommended conservative treatment, and issued a favorable prognosis for slow, spontaneous partial recovery. Insightful wartime clinicians might have forecast a complicating second episode (Burrow, 1919). Due to increased awareness of the high prevalence of psychogenic pseudoneuropathy and the need to protect the patient from the RSD paradigm, it is necessary to carry out a battery of tests including conventional electrodiagnosis, quantitative sensory testing, sympathetic-function tests, thermography, placebo-controlled somatic-nerve block, and sympathetic blocks. This expensive diagnostic protocol is comparatively economic relative to the mystifying and costly diagnostic and therapeutic rituals these patients undergo when labeled through any of the quasiequivalent traditional terms indicated earlier (Ochoa et al, 1994).

Misdiagnosis of Mononeuropathy and Iatrogenic Damage

After moderate accidental stretching of the left shoulder at work, Ms. H developed a chronic painful syndrome that progressively expanded over the course of a few years, compromising the whole left-upper extremity. This symptom complex was associated with

various negative and positive motor and sensory manifestations. For this protracted CPSMV, the patient received a succession of different presumptive diagnoses, addressing the same set of symptoms. She also underwent multiple invasive therapies—arthroscopic surgery; muscle resection; resection of the clavicle; carpal-tunnel surgery; ulnar-nerve transposition; perpetual-multimodal physical therapies; and injections of cortisone and local anesthetics—but none of these measures alleviated the symptoms. This patient, who expressed neurologic symptomatology for several years, was never evaluated neurologically. She underwent surgery to nerves without neurological endorsement. The failure of multiple surgeries to the median and ulnar nerves on the left-upper extremity indicates that the neurologic diagnoses offered to Ms. H were mistaken.

While subsequent neurologic examination of the patient revealed a fully symptomatic case of CPSMV, there was no hypoesthesia for light touch. This exception was objectively documented by generally normal sensory-nerve action potentials. Neurologic examination also disclosed an area of pinprick hypoesthesia on the left hand, uncharacteristically involving all the fingers. This area did not legitimately match the patient's own median-nerve territory, as delineated by the area of lidocaine-induced hypoesthesia; an area that matched thermographic hyperthermia induced by anesthetic block of the left-median nerve. Furthermore, quantitative somatosensory thermotest was within normal limits in both hands. The patient also displayed weakness of the left shoulder and elbow with give-way characteristics even in the absence of significant pain. Motor-nerve conduction study was again normal, while EMG disclosed only mild signs of compensated chronic partial denervation in a muscle supplied by the operated left-ulnar nerve. As with the psychophysical sensory abnormalities found on neurologic examination, there was documented absence of dysfunction of peripheral motor fibers that might explain the patient's regional weakness of voluntary movement. Finally, thermography and laser-doppler capillary flowmetry showed normality of function of vasomotor sympathetic fibers in both upper extremities.

Comment

Ms. H did not have measurable mononeuropathy to explain her symptoms. The weakness of voluntary movement was of cerebral origin since normal EMG activity was interrupted periodically by pauses in the willful drive, even in the absence of pain. The pinprick loss was abolished by placebo, indicating that the area of hypoesthesia was not generated through dysfunction of the afferent pathway at any

level of the peripheral or central nervous system, but through disordered cognitive processing of sensory input. Whereas the patient did not volunteer significant relief of spontaneous pain after a placebo shot, Lidocaine block of the left-median nerve resulted in significant improvement of the pain in the left forearm, far beyond the area of Lidocaine-induced hypoesthesia. This is most likely active placebo effect. Although not necessarily indicative of psychogenic dysfunction, it indicated that Ms. H's pain system could be engaged or disengaged by a medical action operating through psychosomatic brain mechanisms.

Ms. H's past medical records contained evidence of psychiatric dysfunction. However, her final diagnosis of somatization disorder leading to a clinical profile of pseudoneuropathy was based not just on the absence of sufficient neurologic dysfunction nor on the presence of "psychoneurosis." Rather, the diagnosis was based on explicit criteria documenting that her motor and sensory manifestations were, by their physiologic nature, of high cerebral origin. These unfortunate patients are victims of an outdated medical paradigm. They are often treated by well-meaning clinicians who subject them to series of invasive therapies, not free of risk or sequel. After testable diagnoses fail to pan out, these patients are eventually labelled with a diagnosis of RSD if they respond to sympathetic blocks lacking adequate placebo control, ultimately leading to useless sympathectomy. Diagnoses that are not verifiable objectively condemn patients to chronicity and iatrogenesis (Ochoa, 1993; Ochoa, 1996a). Awerbuch (1985) defines iatrogenesis as abnormal diagnostic behavior that leads to abnormal illness behavior in the patient and is invariably compounded by abnormal treatment behavior.

Painful Polyneuropathy

The clinical symptoms and signs of polyneuropathy are familiar to physicians (for reviews see Ochoa, 1980; Thomas and Ochoa, 1993). Patients with polyneuropathy may suffer distressingly painful symptoms. Small-caliber fiber neuropathies tend to be the more painful, although patients with either large- or small-caliber neuropathy will report unpleasant but not necessarily painful sensations when their skin is gently brushed or stroked. This symptom is assumed to amount to actual pain, and much speculation has developed around it. Such brush-induced "allodynia," also termed LTM-mediated allodynia, is commonly taken to herald centralization of mechanisms in neuropathic pain. However, simple multiplication of afferent tactile input in peripheral-nerve fibers can give rise to this symptom (Ochoa, 1990; Campero et al, unpublished).

Conversion somatization can also generate brush-induced dynamic hyperalgesia. Secondary centralization may well be relevant to human somatosensory disorders, but there is no current evidence that the unpleasant sensations induced by light touch in “neuropathic” pain patients are due to a central mechanism (Muscle and Nerve, 1993, pages 1069–1070; Ochoa, 1997).

Patients with painful small-caliber fiber polyneuropathy who have an organic irritative component (primary nociceptor sensitization), always have some objective physical signs such as distal hyporeflexia; regional hyperthermia; A-block-resistant, cross-modality threshold modulation; reduced sensory-nerve action potentials; or a documented etiology for polyneuropathy. (This predominantly irritative clinical-pathophysiologic profile of CPSMV is described below.) However, only a fraction of polyneuropathies are painful because of sensitized nociceptors. As in painful mononeuropathy, the painful component in polyneuropathy may be related to axonal rather than receptor dysfunction, and might be caused by multiplication of primary input in nociceptors. Release of primary-nociceptor input is another peripheral mechanism of painful polyneuropathy. No evidence has been found for sympathetically maintained pain in patients with painful polyneuropathy (Verdugo et al, 1994).

A puzzling and misleading clinical presentation of CPSMV is whole-body pain, a condition that invites the diagnosis of diffuse small-fiber polyneuropathy. These cases should also bring into consideration the differential diagnosis of psychogenic pseudopolyneuropathy to eliminate potential organic causes. Since normal nerve-biopsy results do not totally rule out the possibility of an organically based, purely irritative disease of small-caliber (nociceptor) afferents, other criteria are required for differential diagnosis. Microneurography cannot entirely rule out organic causes because of false-negative results.

The Syndrome of Sensitization of Primary Nociceptors (Erythralgia or ABC Syndrome)

Sensitization of C-polymodal nociceptors gives rise to a striking physical sign—rubor, or erythema, of the symptomatic parts—prompting the term “Erythralgia” (Lewis, 1936). The vasodilatation underlying erythralgia is not the expression of sympathetic vasoparalysis; it is active vasodilatation (see Figure 4 in Ochoa, 1986). These patients may report severe spontaneous pains in the territory of one damaged nerve or in the extremities following polyneuropathic distribution (Rosenbaum and Ochoa, 1993). They may also complain of mechanical hyperalgesia, and their symptomatic skin is not only red but also hot and swollen. These patients often experience worsening of

the pain with warming, and usually benefit from passive cooling for their spontaneous pain and mechanical hyperalgesia (Ochoa, 1986; Culp et al, 1989; Cline et al, 1989). Thermography reveals hyperthermia of the symptomatic parts, and quantitative sensory testing reveals heat hyperalgesia. Testing of autonomic function reveals no impairment in the ability to engage reflex vasoconstriction, indicating that the erythema is not due to sympathetic vasoconstrictor paralysis. Microneurographic recordings from cutaneous nerve fascicles supplying symptomatic skin may reveal abnormal responses in C-polymodal nociceptors; their receptor threshold may be reduced, or (after single electrical impulses delivered to the receptive field) their axons may fire with an abnormal repetitive discharge. From this new understanding, erythralgia was termed ABC (angry, backfiring C-nociceptor) Syndrome (Ochoa, 1986; Cline et al, 1989; Ochoa, 1992a).

Effective activation of sympathetic outflow fails to modify receptor threshold or to induce discharge of sensitized C-nociceptors in ABC Syndrome. It actually induces relief of the temperature-dependent pains through vasoconstriction and cooling.

The Syndrome of Release of Pain Evoked by Low-Temperature Physical Stimuli

Low-temperature stimuli applied to the skin activate cold-specific afferent channels subserved by small-caliber myelinated fibers (MacKenzie et al, 1975; Adriaensen et al, 1983). At noxious intensity, low-temperature stimuli simultaneously coactivate nociceptor afferent channels subserved by unmyelinated C-polymodal nociceptors (Campero et al, 1997). This blended input is believed to mediate the characteristic cold-pain sensation (LaMotte and Thalhammer, 1982; Saumet et al, 1985). For noxious, high-temperature stimuli, the familiar burning pain is also mediated by unmyelinated C-polymodal nociceptors (Van Hees and Gybels, 1981; Ochoa and Torebjörk, 1989; Yarnitsky and Ochoa, 1990a; Yarnitsky et al, 1992). Selective intraneural microstimulation of identified C-nociceptors typically evokes a burning sensation that is resistant to selective myelinated fiber block (Ochoa and Torebjörk, 1989). Nevertheless, during noxious low-temperature stimulation of human skin, the normal subjective experience is cold pain rather than burning pain; the burning component for the C-nociceptor input has been masked.

Selective ischemic blockade of cold-specific cutaneous input increases the magnitude of pain induced by noxious low temperature and changes its subjective quality into a burning sensation (Yarnitsky and Ochoa, 1990b). Like the thermal-grill illusion of Thunberg (Craig and Bushnell, 1994), this para-

doxical phenomenon is thought to be due to central disinhibition, or unmasking. In certain patients with small-caliber fiber neuropathy, low-temperature modulation of C-fiber mediated pain by cold-specific, A-delta neural input disappears. These patients complain of cold hyperalgesia (featuring a paradoxical burning quality), cold hypoesthesia, and cold skin (the Triple Cold-Syndrome) (Ochoa and Yarnitsky, 1994). The cutaneous hypothermia present in symptomatic parts is due to vasospasm, which is caused by partial sympathetic-denervation supersensitivity secondary to unmyelinated fiber loss. The prominence of the nociceptor-mediated cold hyperalgesia, even in the presence of substantial loss of small-caliber fibers, is explained by the minimal requirement for spatial summation of the polymodal nociceptor pain input. The Triple Cold Syndrome is the mirror image of ABC Syndrome, and both are independent clinical entities with definable abnormal mechanisms.

THE PSYCHOGENIC CPSMV SYNDROME

Clinical Features of Psychogenic Pseudoneuropathy

Among the vast population of CPSMV patients examined using scientifically rigorous methods and a broad battery of physiologic and psychophysical tests, the majority were found to lack evidence of organic disease of the nervous system. The clinical-pathophysiological profile of these patients defies the laws of clinical neuroanatomy and neurophysiology, and is, by its explicit nature, an example of psychosomatic disease (Ochoa et al, 1994). Since these patients often display protracted illnesses, their health care is most expensive, and their life quality is tragic.

Psychogenic CPSMV cases usually develop following some form of physical trauma. Symptoms may affect any body part but are most commonly referred to the limbs. Since the extremities have many vulnerable nerves and the clinical profile highlights motor and sensory phenomena, the clinician might initially assume an organic-nerve injury to be the cause of symptoms, even though the profile does not legitimately indicate organic neuropathy. The distinction between organic and psychogenic CPSMV should be uncomplicated on purely clinical grounds. The minimum requirement for differential diagnosis is a thorough history and a qualified neurologic examination. Many CPSMV patients do not receive these requirements; even when a neurologic examination is performed, sensory testing is substandard. Often, neurophysiologic tests are conducted late in the diagnostic schedule, and the many caveats in their interpretation may not be appreciated by the examiner. Thermography is often misinterpreted: a cold limb is

typically misconstrued as evidence of RSD, as are abnormal results from three-phase bone scans.

The characteristically tortuous clinical path followed by many of these patients begins with a visit to the local emergency room, followed by repetitive visits to an orthopedist, chiropractor, physiatrist, or pain-management clinician. Clinical evaluations are followed by x-rays, computerized imaging, arthroscopy, trial surgery for tendon release, and perpetual physical therapy. Surgical decompression or transposition of peripheral nerves is also performed in some of these patients. While some surgical procedures may alleviate the subjective symptoms of CPSMV patients, sometimes for months, the treating physician often faces the reality that the patient's symptoms have been refractory or have worsened. These puzzling evolutionary features, together with common vasomotor symptoms and a possible abnormality in the three-phase bone scan, usually lead the treating physician toward a diagnosis of RSD, thereby condemning the patient to further interventions sustained by criteria that, today, do not stand up to scientific scrutiny (as in the case of Ms. H). These initiatives, usually intended for sympatholysis, are assumed to be validated by the patient's subjective improvement in the short term, regardless of whether physiologic sympatholysis is achieved or not. These patients may end up having a failed surgical sympathectomy. The enormous socioeconomic impact of these patients was reported in the Proceedings of the 1993 World Congress on Pain (Ochoa et al, 1994).

When CPSMV patients of this type eventually come in for specialized neurologic assessment, they are still communicating pain, they have received many different diagnoses for the same clinical picture, and they have been subjected to numerous expensive and nonproductive tests and treatments. Many have undergone conventional psychologic testing, the common diagnostic outcome being depressive syndrome *secondary* to RSD. These patients are usually on multiple medications, including addicting pain killers. Symptoms and signs of iatrogenic damage induced by medical treatment are commonplace, and patients may have multiple surgical scars. Another striking feature of undiagnosed psychogenic CPSMV patients is that their clinical symptomatology, unlike the natural outcome for mechanical injury, has expanded and worsened over time. Most of these patients have never undergone formal neurologic, neurophysiologic, or in-depth neuropsychological evaluation.

Clinical and physiologic assessment of the motor component in these patients reveals that weakness of voluntary movement is not due to organic damage of

lower motor neurons—there is no myopathy, no end-plate dysfunction, and no nerve-fiber loss. Nor is there nerve-conduction block. The alternative hypothesis—that the motor dysfunction may be due to secondary centralization of the organic consequences of primary peripheral damage—can be ruled out by the overall normality of central conduction, as measured through transcranial magnetic stimulation of the motor cortex. Clinical assessment of the expanded sensory loss commonly displayed by this kind of CPSMV patients typically reveals that hypoesthesia is nondermatomal, a finding that has been classified as a conversion symptom (Fishbain et al, 1991). Neurophysiologic assessment can confirm the absence of an organic basis for the hypoesthesia. Test results for peripheral and central sensory conduction are normal (Alajouanine et al, 1958; Bergamini and Bergamasco, 1967; Lacerenza et al, 1996). Vasomotor signs—e.g., hypothermia of the symptomatic parts with a glove or stocking distribution—are due to vasoconstriction not caused by sympathetic-denervation supersensitivity, but rather by increased neural sympathetic tone, as revealed by regional vasodilatation and warming after sympathetic block, sympathectomy, or block of somatic nerves. The source of any sympathetically mediated vasoconstriction of symptomatic parts in this kind of CPSMV is multifactorial; it does not exclude psychogenicity as a possible factor and is not mechanically related to the pain. Together with the nonspecific three-phase bone scan, this physical-sign hypothermia—which misled theorists of causalgia-RSD in the past—continues to mislead diagnosticians today (Ochoa, 1991b; 1992b; Ochoa and Verdugo, 1992; Ochoa and Verdugo 1993; Ochoa, 1994).

Neurologists and anesthesiologists at the Mayo Clinic claim that the quantitative sweat test is 94% specific for the diagnosis of RSD (Chelimsky et al, 1995). However, nothing can be that specific in a population of patients with heterogeneous pathophysiologic backgrounds. Most of the roughly four-hundred neurologic patients in the Mayo study had not been examined neurologically, and the sympathetic blocks that led to the diagnosis of RSD were not placebo-controlled. A prior publication on the same patients had reported, conversely, that the test was nonspecific (Chelimsky et al, 1991). Realistic skepticism of the editorial invited by Mayo Clinic Proceedings led to controverted letters to the editor (Ochoa, 1995; Chelimsky et al, 1996; Ochoa, 1996).

Clinical and scientific investigation of the origin of the painful components in CPSMV patients is difficult and requires several tests that are seldom performed. As a result, the diagnostic significance of the pain is traditionally misconstrued. Plural types of

spontaneous pains, mechanical hyperalgesias, and thermal hyperalgesias are described. Constant ongoing pain, often with a burning component, is the most common type of spontaneous pain. Dynamic mechanical hyperalgesia and thermal (cold) hyperalgesia are the predominant abnormal-stimulus induced pains. The response of these patients to properly controlled placebo is remarkable, in that close to two-thirds of patients (that is, twice the number of the nonspecific-pain population) respond with significant pain relief on a placebo basis (Verdugo and Ochoa, 1994a).

It should be reemphasized that relief of pain through a medical intervention targeting the psyche does not necessarily indicate that the symptom is psychogenic (Ochoa, 1991b; Ochoa, 1993). But diagnostic tests that rely on relief of subjective phenomena, yet do not include placebo control, are not only invalid but are dangerously misleading and ethically questionable. In sum, chronic pain that responds dramatically to a placebo intervention need not be psychogenic, but may be so. The widespread performance of diagnostic blocks without proper placebo control hurts the patient, society, and the economy. When a diagnostic somatic local-nerve block successfully anesthetizes the symptomatic part without relieving the pain, the symptoms must be of central origin. However, a distinction between organic and psychogenic central mechanisms is mandatory and requires further testing.

The characteristics of the hyperalgesia volunteered by psychogenic CPSMV patients are also remarkable. In these patients, hyperalgesia is usually not distributed to nerve or nerve-root territories. Instead, the distribution typically has a glove or stocking shape and affects entire body quadrants or even larger regions. Intriguingly, such neuroanatomically incompatible areas of hyperalgesia may remain consistently located when retested. Moreover, these areas may match very closely the areas of hypoesthesia even when the areas tested are broad, and even when the patient may not be able to see the parts being tested. Such consistency neither proves organic origin nor rules out psychogenic origin. Like spontaneous pain, mechanical hyperalgesia, especially that of dynamic subtype, is highly responsive to placebo intervention (Verdugo and Ochoa, 1994a).

In patients expressing psychogenic pseudoneuropathic CPSMV, the effect of sympathetic block on painful symptoms is a matter of great importance. These patients respond highly to placebo, particularly to active placebo (observation by Verdugo, described in Ochoa et al, 1994). Psychogenic CPSMV patients who are not placebo responders but whose painful symptoms are relieved by effective sympatholysis

(and exaggerated by sympathomimetic substances) are exceptionally rare. In these cases, symptoms may be dependent upon circulatory or temperature factors fortuitously changed by sympatholysis. Vasodilatation may reduce the pain when it depends on ischemia or low temperature of the symptomatic part, or worsen the pain when it depends on warming up (Ochoa, 1992a).

Special Studies in Psychogenic Pseudoneuropathy

Microneurography

This technique may contribute useful information on the nature of the pains and hyperalgesias in psychogenic CPSMV patients. Indeed, in patients with pseudopolyneuropathic ABC Syndrome, microneurography may reveal intact receptor-response characteristics of primary nociceptors. In psychogenic CPSMV patients who report dynamic LTM-mediated mechanical hyperalgesia, microneurography shows normal receptor responses in low-threshold mechanoreceptors. The responses are quite different in patients with organic disease who have the same symptom (Campero et al, unpublished). In psychogenic CPSMV patients who are mistakenly assumed to have sympathetically mediated pains, microneurography shows the absence of signs of abnormal excitation of primary low-threshold mechanoreceptors during effective reflex activation of sympathetic outflow to the symptomatic part (Dotson, 1993).

Furthermore, selective intraneural microstimulation of identified low-threshold mechanoreceptor afferents serving areas with chronic spontaneous pain and hyperalgesia typically evokes the normal painless sensations expected for those sensory channels. Microstimulation does not evoke the pain that would be anticipated if low-threshold mechanoreceptor input were activating sensitized pain-signalling neurons in the central nervous system (Dotson et al, 1992; Dotson, 1993; Campero et al, unpublished).

Nerve Biopsy and Histopathology

It is unusual for patients with CPSMV lacking an ostensible organic neuropathy to undergo histopathologic studies of nerve. However, when they do, the nerves are usually found to be normal. Cases in which psychogenic pseudoneuropathy clearly complicated a histologically proven mononeuropathy have been presented (Mrs. VM, case 3 in chapter 16 of Rosenbaum and Ochoa, 1993). It is not infrequent for patients with CPSMV affecting a foot to be tentatively diagnosed as having Morton's neuroma. When a neuroma is the legitimate cause of the pain, surgical excision invariably results in permanent

relief, and a grossly abnormal histological specimen is found. When the digital plantar nerves are not the cause of the CPSMV, relief through neurectomy is transient, at best. Nevertheless, the histologic specimen is usually reported as abnormal, because most adults have chronically entrapped, histopathologically abnormal, but asymptomatic plantar nerves. Under these circumstances it is difficult to persuade surgeon and patient that the diagnosis was in error.

Surveillance

When faced with a CPSMV patient whose clinical and laboratory tests fail to show evidence of organic disease, clinicians consider any of several diagnoses:

1. the patient has RSD and SMP;
2. the patient has centralized, organically based pain; or
3. the patient has centralized psychogenic pain that may either be the unconscious manifestation of psychological somatization or a conscious construct intended to deceive (Voiss, 1995).

Scientists and experimental psychologists interested in clinical pain characteristically consider only one or two of these options: SMP and organic centralization. Clinicians must incorporate the spectrum of possible psychogenic conditions into the differential diagnosis of this subgroup of CPSMV patients.

Accurate differentiation between subtypes of psychogenic CPSMV cases is usually difficult, and video surveillance may be the only way to distinguish the malingerer and the Münchhausen's case from the more frequent unconscious somatizer. The following case is memorable in this regard.

Mr. O, a man with a tormented social history, was referred with a diagnosis of posttraumatic RSD. He had been unable to work for one year due to a reported escalating syndrome of severe spontaneous pain, exquisite mechanical hyperalgesia in glove pattern, weakness, numbness, dystonic hand posture, and episodic swelling of the left hand. These symptoms had been precipitated by a mild physical trauma at work. Prior to the diagnosis of RSD, he had received a standard series of diagnoses that ranged from tendinitis to cellulitis, to CTS. Test results for those conditions were either negative or borderline. Nevertheless, invasive therapy had been instituted for more than one of those diagnoses and had failed. The patient had astutely rejected major surgical procedures but had accepted increasing doses of narcotic analgesics. He reportedly was unable to work due to insufferable pain and clumsiness of the symptomatic hand. There was major litigation in progress. Mr. O had been through independent medical evaluations in four different

states. One group of consultants had remarked on the presence of striking and precisely demarcated edema of the bad hand (ligature sign). Comprehensive clinical and pathophysiologic evaluation revealed no evidence of nerve injury to explain the patient's bizarre left-hand sensory and motor deficits. After a lunch break during one of the evaluations, the patient presented with an extremely cold hand, colder than ambient temperature (probably induced by ice-water immersion). He explained that episodes of local hypothermia of the painful hand could occur unpredictably. Placebo-controlled sympathetic block ruled out sympathetically maintained pain. Placebo-controlled local anesthetic blocks of the left-median and left-ulnar nerves—in separate sessions—revealed an active placebo effect on pain and hyperalgesia.

The cumulative evidence when considering Mr. O's CPSMV left little doubt that his "neuropathic" sensory-motor deficit was not due to organic damage in peripheral or central sensory and motor pathways. In addition, there were strong indications that substantial psychological factors were involved in generating at least part of the clinical syndrome. A surveillance video secretly made of the patient unambiguously revealed that the source of his symptoms was both psychogenic and conscious. He was shown casting fishing lines, holding nets, transporting equipment, and pulling salmon out of the water, making unrestricted use of his reportedly painful left upper extremity.

Evidence that Psychogenic CPSMV Patients Do Not Have Sympathetically Maintained Pains

When CPSMV cannot be attributed to neuropathophysiological causes, the diagnostician often retreats to RSD as a consolation term and sympathetically maintained pain (SMP) as the presumed underlying mechanism. Pain is traditionally attributed to sympathetic events under several rationales:

1. Vasomotor signs may be present in the symptomatic parts of the body; however, these signs might be unrelated to the sympathetic system, the consequence of sympathetic ablation, or a genuine reflection of increased sympathetic activity not necessarily related to pain (Ochoa, 1991b, 1992a, 1992b, 1993; Ochoa and Verdugo, 1992; Rosenbaum and Ochoa, 1993).
2. A routine sympathetic block that eliminates the painful symptoms may be taken by the clinician as evidence of an organic condition associated with a sympathetic mechanism for the pain. However, an effective but uncontrolled sympathetic block does not prove the existence SMP; in fact, placebo-controlled block regularly

rules out SMP (Verdugo and Ochoa, 1994b, 1995; Jadad et al, 1995; Ramamurthy et al, 1995). After revising their placebo-controlled, phentolamine-block protocol, habitual proponents of RSD/SMP now concede "the great majority of our patients with severe chronic pain do not in fact have SMP" (Campbell and Raja, 1995 *Letter to the Editor*; Verdugo and Ochoa, 1995, Reply; Is there SMP in "animal models" of "neuropathic pain and RSD"? (Jänig, 1991; Ochoa, 1992a) Scientists have reported that sympathectomy does not modify pain behavior in animals with an experimental painful mononeuropathy (Neil et al, 1991; Wakisaka et al, 1991) At best, sympathectomy done before or immediately after experimental nerve injury, improves cold hyperalgesia in the rat (Bennett, 1993). Whereas sympatholysis reverses mechanical allodynia in a rat model of spinal-root injury (Kim and Chung, 1991), results were different in a primate model of painful nerve injury generated in the same institution; phentolamine sympathetic block had a "variable effect on mechanical and cold allodynia in neuropathic primates, . . . [emphasizing] that placebo controls are an important factor when determining efficacy of drugs" (Carlton et al, 1993).

3. Three phase-bone scan (TPBS) results may be abnormal. However, bone-scan changes are decidedly nonspecific. The assumption that abnormal TPBSs are specific for RSD, thereby implicating SMP, fails to take into account that RSD is a purely descriptive term that embraces any number of organic and psychogenic conditions. Therefore, the abnormality of the TPBS in RSD must logically be related to a circumstantial epiphenomenon common to some patients with CPSMV, rather than to a hypothetical, unique mechanistic derangement. In addition, sympathectomy, which is historically reputed to cure RSD, readily generates the TPBS abnormalities mistaken as specific for RSD (Mailis et al, 1994). In fact, abnormal TPBS results may be reversed dramatically when patients within the subcategory of CPSMV are successfully treated through means other than sympatholysis or narcotics (see case study, below).

Patients with CPSMV and no demonstrable organic lesion may display prominent negative sensory and motor manifestations. Such manifestations may disappear after sympathetic block. No rational explanation has been advanced for the negative neuromuscular symptoms in patients

diagnosed with SMP. It proves impossible to explain neurophysiologically why negative phenomena in the absence of peripheral and central impulse-conduction block may normalize after a medical intervention. Hypoesthesia and muscle paresis do not normalize through blocks in organic neuropathies. Such normalization is perplexing until it is seen as a placebo response in which a psychophysical deficit of psychogenic origin has been reversed.

Criteria for a Primary Psychogenic Mechanism in Pseudoneuropathic CPSMV Patients

Some patients with genuine organic disease of nerve, plexus or nerve root, sooner or later express psychogenic symptoms.

CPSMV in Mr. I

Episode 2. After being seen in August of 1987, Mr. I did not seek further medical attention for the residual neuromuscular syndrome involving his right hand. Over the ensuing years, he observed slow recovery of muscle strength and sensory acuity in the right hand. However, the dynamic mechanical hyperalgesia persisted, and his hand was still, at times, described as "colder." He was able to sustain a job as a heavy-equipment mechanic. Then, in the summer of 1992, while at work, he experienced an episode of paralysis and sensory loss of the whole right hand that lasted about 15 minutes. For 10 minutes during the course of spontaneous recovery of motor and sensory function, he experienced extreme pain in the entire hand and wrist. Similar episodes followed.

Neurologic examination in October 1992 revealed recovery of muscle bulk and strength in muscles innervated by the right median nerve. There was no tactile hypoesthesia, but thermal sensations were defective in median-nerve territory. Electrodiagnosis revealed subclinical persistence of partial axonal pathology in median-sensory and motor-nerve fibers. There were no signs of active denervation in median-nerve muscles, and signs of reinnervation were obvious. The dynamic, cutaneous, mechanical hyperalgesia remained strikingly present in the right-median territory; the pattern was identical to that portrayed in a color photograph retained in his 1987 medical records. There had been no shrinkage and no expansion of the area of mechanical hyperalgesia from where light touch typically evoked an unpleasant but not necessarily painful sensation (Discussions, Symposium on Neuropathic Pains, 1993). Mr. I's hyperalgesia, which was shown in 1987 to be mediated by myelinated fibers, was the likely consequence of stimulus-induced after-discharge in ectopic-impulse generators within the median nerve at the site of the original mechanical

injury. Microneurographic evidence of ephaptic transmission was not forthcoming, but the possibility was not ruled out, particularly since gentle mechanical stimuli delivered focally in the hyperalgesic palm evoked dysesthetic sensations projected to the index and middle fingers (See Ochs et al, 1989). On several occasions during our microneurographic recording, the patient reported brief episodes of painful paralysis of the hand. During these episodes, right-median nerve stimulation revealed the paralyzed neuromuscular apparatus to be physiologically intact.

When told that the recurrent episodes of painful paralysis and anesthesia of the right hand might be due to psychogenic somatoform conversion, the patient acknowledged the possibility and reported being under significant stress. When contacted on the telephone in the fall of 1994, Mr. I reported that he continued to experience biweekly episodes of painful paralysis and anesthesia of the right hand. The insurance company decided not to authorize specific therapy. The palm of his hand remained hyperalgesic. He continued to work as a heavy-equipment mechanic.

Comment

Even when this patient developed an unquestionable psychogenic CPSMV syndrome, the preexisting, organically based mechanical hyperalgesia remained unchanged in quality and localization; it did not expand as commonly seen in patients with psychogenic CPSMV. The new episodes of paralysis were not due to organic neuromuscular dysfunction and the associated pain was probably also psychogenic.

In contrast to Mr. I, most patients with psychogenic CPSMV do not have an organic dysfunction of the nervous system. This assertion would be circular if the criterion for psychogenicity relied solely on the absence of evidence of an organic cause. Indeed, patients with CPSMV who have no evidence of organic dysfunction might have either a psychogenic disease or an organic disease that the clinician is unable to identify. Criteria are proposed below that, in the author's view, will explicitly detect psychogenicity of motor or sensory manifestations in pseudoneuropathic CPSMV patients (Ochoa et al, 1994). We have already questioned the validity of the concept that insignificant primary-nerve irritation might chronically maintain a state of secondary hyperexcitability in dorsal-horn neurons, thereby producing a clinical picture of full blown CPSMV and its sympathetic dependence (Ochoa, 1997).

Throughout this article, the author has steadily used the term psychogenic (Engel, 1959), even though it has become fashionable to regard it as obsolete (Davis; 1990; Pilowski, 1990). However, in

the realm of physiologic differential diagnosis, the term serves an irreplaceable function.

Criteria for Psychogenicity of Neuromuscular-Motor and Sensory Symptoms and Signs

Unfailingly, patients with CPSMV who lack organic neurologic disease exhibit weakness of voluntary movement that can be traced to dysfunction at the level of the motor brain. This kind of weakness may also affect patients with organically based CPSMV complicated by psychogenic elements. A strong, voluntary muscular contraction correlating with a full-interference EMG pattern of motor-unit potentials indicates that the motor apparatus is intact between motor cortex and muscle. When the voluntary drive is discontinued, the muscle contraction relaxes and the EMG tracing becomes flat, which it normally is at rest. Willful initiation and maintenance of voluntary muscle contraction are normally arrested by willful interruption of the voluntary act. Voluntary muscle contraction punctuated by intermittent give-way, correlating with an EMG profile of full-interference pattern alternating with intermissions, is characteristic of psychogenic weakness in the absence of extrapyramidal disease (Verdugo and Ochoa, 1993; Willbourn, 1995). Patients with psychogenic CPSMV characteristically exhibit this type of voluntary muscle weakness. This profile does not quite differentiate unconscious somatization from malingering.

Disappearance of muscle weakness in response to a placebo is hard to explain through organic dysfunction of the motor apparatus anywhere from motor brain to the muscle. Could it be explained through some as yet undescribed, dynamic, physiologic anomaly exclusive to CPSMV patients who lack evidence of organic dysfunction? Such a hypothetical mechanism would be reversible by a medical intervention acting through the psyche, which is unlikely. Moreover, such an anomaly—one that would block impulses initiated through willful drive at the cortical level—would not be expressed when the same weak motor apparatus is activated from the same cortex but via transcortical magnetostimulation. It is unreasonable to consider that such placebo-responsive weakness, which is characterized by voluntary hesitancy and which fails to be expressed when the motor apparatus is tested without participation of the patient's will, might be the consequence of a nondescript, organically based pathophysiologic condition of the central nervous system. Why remain averse to the possibility that a legitimate health disorder centered in the psyche, a brain function, might be the cause for such weakness? There is ample precedent for this (Charcot, 1887; Gowers, 1886; Déjérine, 1901; Ford, 1995). Abolition through

placebo of the associated dystonia, not an uncommon symptom in these patients, most likely also indicates a psychogenic origin of the movement disorder (Monday and Jankovic, 1993; Marjama et al, 1995; Fahn 1996).

A similar argument for psychogenicity and against the hypothetical, dynamic, secondary, central organic disruption can be made for the removal of psychophysical hypoesthesia in response to placebo in CPSMV patients. In a pertinent study (Verdugo and Ochoa, 1992b), a population of CPSMV patients was described whose hypoesthesia was erased through the action of placebo effect. This phenomenon was proposed as a sign of psychogenicity. Our argument is as follows: neurapraxia, neurotmesis, or axonotmesis as consequences of organic-nerve injury could not possibly reverse transiently under the influence of placebo. Might there be some kind of dynamic functional block in the dorsal horns, or higher up along the somatosensory line that would prevent sensory perception from the symptomatic area? If so, through what mechanism would placebo reverse it? Moreover, how could the block prevent afferent transmission without affecting normality of somatosensory-evoked potentials all the way between peripheral nerve and the cortical generators of the evoked potentials? Again, as with the placebo-responsive weakness associated with interrupted effort and normal peripheral and central motor conduction, the functional block of sensation must lie at the interface between somatosensory brain and mind: in between *psycho* and *somatic* functions. There is immediate precedent for this hypothetical block at the higher functions of motor programming and sensory decoding. It has been persuasively argued, on the basis of actual records of metabolic brain activity in patients with chronic psychogenic pain, that hyperactivity in the limbic brain may inadequately turn on inhibitory mechanisms (Derbyshire et al, 1995). Thus, anomalous interaction between the emotional and the somatosensory brain might generate abnormal spontaneous sensation inclusive of pain, and, we hypothesize, abnormal sensory (and motor) block.

Merskey (1995) questioned psychological phenomena as primary determinants of the RSD complex. He argues that psychopathology is uncommon in that category of CPSMV patients. But the specialty of psychiatry is not equipped for explicit diagnosis of patients who express chronic pain in the realm of sensory, motor, or vasomotor psychophysical symptoms and signs. It is not presence or absence of psychiatrically assessed psychopathology that enables the differentiation between neurologic and psychologic CPSMV. Rather, it is the neurologically assessed nature of the psychophysical symptoms and signs

that establishes the difference (Ochoa, 1995b). Merskey's criteria for identifying psychopathology must lead to an underestimation; it was found that over half of a population of patients with CPSMV fitting Merskey's criteria for causalgia RSD (IASP, 1986) were, to use Engel's terminology, "psychogenic" (Ochoa et al, 1994). The equivalent psychiatric term, *somatoform disorder*, ranked as the "blind spot" of medicine and generates close to half of all new general medical and as many neurological consultations (Ford, 1995; Ron, 1994; Ewald et al, 1994). Quill (1985) writes,

Patients with somatization disorders are frequently unrecognized and misdiagnosed. The diagnosis depends on recognizing a long-standing pattern of seeking medical intervention for vague, multisystemic symptoms, often without clear physical cause. These patients use symptoms as a way to communicate, express emotion, and be taken care of. Instead of recognizing the disorder and exploring psychosocial contributions to illness, nonpsychiatric physicians tend to repeatedly pursue organic possibilities through multiple tests, procedures, medications, and operations. In patients with somatization disorders, the dollar costs of this strategy are only exceeded by its potential for iatrogenic harm. More productive treatment strategies are presented, emphasizing the need for a long-term relationship with a primary-care provider who will treat the patient and his symptoms seriously and respectfully but who is not compelled to invasively evaluate all symptoms.

In a large study that examined fourteen common presenting somatic complaints, it was found that, on average, an organic diagnosis was established in only one in six patients. The most common presenting symptoms were pain complaints and fatigue (Kroenke and Mangelsdorff, 1989). Some psychiatrists (e.g., Egle and Hoffmann, 1992) have questioned Blumberg's concept that RSD is a discrete and organically based neurologic entity. Others have emphasized abundant preexisting psychological dysfunction in RSD patients (Van Houdenhove et al, 1994). Somatization is a fundamental medical concept (Lipowski, 1988). In the editorial "Somatization in Neurological Practice," Ron (1994) emphasizes that in these patients "classic psychiatric symptoms may be absent and the mental state may seem to be entirely normal." She also reminds us that

the patient's contact with the medical profession may serve to consolidate the symptoms by paying undue attention to them or by providing a quasi-scientific explanation. In this way a symptom that initially may have a doubtful significance in the

patient's mind becomes legitimized, and the presence of anxiety or depression is explained away as an appropriate reaction to a disturbing physical symptom. . . . a pragmatic multidisciplinary approach to management of these patients is required . . . when all else fails, prevention of iatrogenic damage and unnecessary use of resources remain worthwhile aims.

Those who doubt the power of psychogenic disease are at least 2½ centuries behind, and myopically "dismiss in scorn" those whose views are current. Cheyne (1733) remarked:

Nervous distempers are under some kind of disgrace and imputation in the opinion of the Vulgar and Unlearned. They pass among the multitude for a lower degree of Lunacy. Often when I have been consulted in a case, and found it to be what is commonly called "nervous," I have been in the utmost difficulty when desired to define or name the distemper. If I called the case glandular, with nervous symptoms, they concluded I thought them pox'd or had the King's Evil. If I said it was vapors, hysteric or hypochondriacal disorders, they thought I called them mad or fantastical and was thought as rude, a fool, a weak and ignorant coxcomb, and perhaps dismissed in scorn for seeming to impeach their courage. Notwithstanding all this, the disease is as much a bodily distemper as the smallpox or a fever, and I think never happens to any but those of the liveliest and quickest natural parts, and particularly where there is the most delicate sensation and taste, both of pleasure and pain.

For a patient with CPSMV for whom evidence is raised that the pertinent motor and sensory systems are functionally intact both peripherally and centrally, secret surveillance can provide evidence to indicate whether or not the illness was a deliberate fraud perpetrated by the patient (Voiss, 1995).

Therapeutic Evidence in Support of Psychogenic CPSMV Patients

A powerful piece of evidence for psychogenic CPSMV is the rapid reversal of all symptomatology through appropriate psychiatric treatment, including hypnotherapy and cognitive psychotherapy delivered by any qualified physician or psychologist. It should be emphasized that even the objective signs, usually taken as proof of both organicity and sympathetic mediation of the syndrome—namely the hypothermia and the abnormal three-phase bone scan—may be completely normalized by psychotherapy in these cases. This outcome defies the common misdiagnosis of depression "secondary" to RSD in these patients, as illustrated in the following description.

Ms. B slipped on a wet floor and hurt her right ankle during a social gathering. However, the burning pain did not prevent her from continuing to participate. Days later, she noticed stiffness of the right ankle and the pain worsened and spread to involve the whole foot which became cold and somewhat swollen. Gently stroking or rubbing the skin of the foot evoked pain. A physician's assistant diagnosed an ankle sprain. X-rays were negative. Symptoms progressively worsened and ascended to involve the whole leg. Some three weeks after the fall, a three phase isotope bone scan was abnormal and assessed as "consistent with reflex sympathetic dystrophy in the right foot." An orthopedist expert in "RSD" initiated treatment with Amitriptyline and recommended "a series of spinal blocks, weekly, for up to six months." Alarmed, patient and mother obtained a second opinion.

When seen four weeks after onset, the patient complained of constant burning pain associated with hypoesthesia and hyperalgesia of the whole right leg and foot. All movements of the right foot were reported weak and there was a spontaneous tremor of the foot which was described as bluish and cold. She was now on prescribed codeine. On examination the right lower limb was hypothermic and somewhat discolored. There was no overt edema. Peripheral pulses were symmetrical. There was some muscle atrophy in the right leg. Voluntary movements of the right ankle and the right knee exhibited give-way weakness. There was a fine flexion-extension tremor of the right foot. She displayed a psychophysical stocking of hypoesthesia to pin prick, associated with mechanical hyperalgesia to the ankle level. She could not feel warm stimuli and yet cold sensation was intact in the right foot. Tendon reflexes were normal. She used a crutch.

Thermography revealed diffuse hypothermia of the right lower extremity. Sensory and motor nerve conduction studies in peroneal, posterior tibial and sural nerves were normal. There were no signs of denervation in the clinically weak muscles. The tibialis anterior displayed rhythmical groups of motor unit discharge corresponding to the clinical tremor. She signalled cold hyperalgesia to quantitative thermal sensory test in the symptomatic limb. Placebo controlled local anesthetic block of the superficial peroneal nerve at ankle level led to significant inert placebo-based improvement of the spontaneous pain and mechanical hyperalgesia. Thermography recorded temporary vasoparalytic hyperthermia induced by nerve block in the appropriate cutaneous territory on the dorsum of the foot, indicating that the patient's baseline hypothermia was not due to sympathetic denervation supersensitivity. A placebo-controlled intravenous Phentola-

mine sympathetic block showed absence of dependence of the spontaneous pain and hyperalgesia upon function of the sympathetic system.

The patient and her mother were informed that her "sympathetic dystrophy" was not due to nerve injury and did not require sympathectomy [November, 1993]. We explained that she suffered from a "centralized" pain and we felt confident that would recover with conservative treatment. When followed up on December, 1993 she was basically unchanged. She still displayed a constant tremor on the right foot. There were no substantial changes on examination, except for mild edema of the right foot. We insisted we were certain there was no nerve injury nor sympathetically maintained pain. We emphasized that she should be protected from any future attempts at sympatholysis or surgery. We also explained, hoping not to be "dismissed in scorn," that in our opinion her centralized pain was being engineered in her brain. In January, 1994 the patient asked to be seen immediately because of unbearable pain. She walked in on crutches complaining of spontaneous pain rated at 10 in the scale of 10. However, she did state that after the previous visit she had improved and was making good progress with physical therapy; she was now able to move the ankle, and walking was less painful. On examination, she was able to move the ankle in all directions without pain. However, she could not walk without the aid of crutches due to pain now in the right thigh and hip. Local infiltration of the right superficial peroneal nerve in the leg with 5 ml. of lidocaine resulted in complete abolition of the spontaneous pain in the thigh and hip, most likely a nonspecific response to an active drug. Several days later the patient was seen again with short notice. She reported increased pain and inability to walk on her right foot. The pain was now in the proximal limb. Neurological examination, thermography and quantitative sensory testing continued to reveal the same initial anomalies. We told her mother that, in our opinion, the patient's chronic painful syndrome was due to a somatoform reaction. The mother felt the hypothesis was reasonable and suggested that perhaps the patient might be "utilizing her symptoms." She felt that this might be a reaction to a recent family crisis. The patient was then briefed on the meaning of somatoform pains, emphasizing that neither means "madness" nor "faking." She was encouraged to continue on physical therapy and was introduced to a former patient with a very similar clinical profile who was currently cured through cognitive psychotherapy.

In February, 1994 the patient came in for follow-up. She stated that three weeks earlier she had decided "she was tired of being crippled and having

her leg and foot disabled." Despite pain she started using a regular shoe and within a few days began to notice significant relief. She then became symptom free. All positive and negative sensory and motor manifestations in the right lower extremity disappeared and color and temperature normalized. She volunteered that she recognized several psychosocial stressors in her life and she was now working cognitively on them. Neurological examination, thermography and quantitative sensory testing had normalized. A follow-up three-phase bone scan was now completely normal. Followed up in December 1994, August 1995, and early 1996, the patient remained asymptomatic. In the interim, she has served as a volunteer role model for other patients suffering from her same condition.

Comment

Ms. B is one in our series of some dozen patients with "psychogenic" RSD who have now been relieved through cognitive psychotherapy. All of these patients readily recognize the psychogenic nature of their disorder. They acknowledge the dramatic reversal of invasive and expanding symptomatology as a consequence of accurate diagnosis and initiation of cognitive psychotherapy. They also attach significant beneficial value to their having interacted with other patients who had had the same syndrome and were now symptom free through a nonsurgical or pharmacological approach. These patients who responded to psychotherapy not only did not have an organic basis for their "neuropathic painful syndrome," but displayed explicit neurophysiological evidence that it originated in the brain-mind. Hypnotherapy in good hands may be highly effective in psychogenic "RSD" patients [David C. Flemming and M.J. Gainer, personal communication 1996].

The enigmatic case publicized through the television series "Unsolved Mysteries" (NBC December 27, 1996), entitled "Trishia's Miracle" challenges differential diagnosis. Dramatic cure of the malignant "RSD" profile of the attractive teenager, attributed to miracle, may well have been a medical cure achieved through a spiritual-psychological endeavor coadministered by her parents.

NOTE ON OVERALL THERAPY FOR CPSMV

The issue of therapy for "chronic neuropathic pains" is complex, delicate, and surrounded by justified pessimism. It is generally believed that failure to cure chronic neuropathic pains is explained by idiosyncrasies of natural repair of the highly differentiated neurite. It is also assumed that natural healing of neuropathy is pathologically jeopardized by two sets of complications: a) the sympathetic

system gets in the way and causes pain, and b) the central nervous system becomes secondarily damaged through plasticity changes which by themselves generate intractable pain." Bennett (1994) evangelizes ". . . pain is not just a symptom demanding our compassion; it can be an aggressive disease that damages the nervous system." There now exists adequate scientific and medical evidence to challenge putative "sympathetic" and "organic centralized" explanations for CPSMV [Ochoa, 1991b, 1992b; Ochoa and Verdugo, 1992, 1993, 1995; Verdugo and Ochoa, 1994a,b; 1995; Ochoa, 1994a,b; 1995a,b; Ochoa, 1997].

Paradoxically, reasons for the altogether poor results of therapy for "chronic neuropathic pains" are less related to the pathobiology of nerves and somatic sensation than to a common misunderstanding of the nature of the abnormal mechanisms. This misunderstanding not only steers medical management towards failure, but it fosters iatrogenesis (Verdugo and Ochoa, 1995). A significant percentage of "chronic neuropathic" pain patients harbor a somatoform disorder that explains the whole set of painful sensory, motor, and vasomotor manifestations (Ochoa et al, 1994). These patients are treated for "nerve injury," for "sympathetically maintained pain," or for "dysfunctional central sensory neurons" assumed to have been made "hyperexcitable" by the "pain disease." This is the principal determinant of our failure as therapists for chronic neuropathic pains (See Ochoa, 1993). Under the present circumstances, it becomes as important to develop neuropharmacological means to control receptor sensitization, ectopic axonal discharge, or to enhance nerve repair (Ochoa, 1995a; 1995b) as it is to protect "chronic neuropathic pain patients" whose symptoms are psychogenic from iatrogenesis born out of misdiagnosis. Unfortunately, "The new-found experts developed therapeutic empires with a vigorous entrepreneurial spirit that was undeterred by the *ineffectiveness* of their treatment methods." (D.S. Bell, 1989)

HOW ALIENATED IS THE AUTHOR'S VIEWPOINT?

Not at all: *Merritt's Textbook of Neurology* (1995) agrees with us in page 29.

" a major problem (with RSD) . . . is the lack of properly controlled comparison of placebo with sympathetic blockade as well as the difficulty in evaluating psychogenic factors and the confusion caused by incomplete syndromes, etc.

In turn, *Neurology in Clinical Practice*, (1996) also agrees in page 394:

"Investigators raise the important point that physiological and pathological involvement of specific peripheral and central pain pathways have

not been conclusively demonstrated. In fact, placebo effect may account for a significant number of patients with neuropathic pain who “respond to sympathetic block.”

And in page 823 it states:

“The Clinical Foundation for Sympathetically Maintained Pain as a mechanism of neuropathic pain is undergoing serious debate.”

Read also what the latest *academic anesthesiologists* say about diagnostic-therapeutic blocks (Hogan and Abram, 1997):

“Current neurophysiologic evidence does not infer pathogenic mechanism, site or transmission pathway from observations during neural blockade. . . .”

“The ambiguity created by the placebo responses is a major impediment to the valid use of neural blockade for diagnosis.”

“The diagnostic value of sympathetic blockade has been overestimated”...

“There should be caution to avoid the circular logic of defining sympathetically maintained pain as a condition improved by sympathetic blocks, etc.”

“These procedures in general lack thorough documentation of clinical usefulness.”

More importantly, patients also have something to say.

“Your conclusions as to sympathetic blocks and sympathectomies and therefore your dispute with the RSD/SMP name of this chronic-pain condition would seem to be confirmed by the 8 years experiences of our 45 members. The 33-year-old founder and director of our support group suffered a jammed-thumb in a volleyball game and immediate severe RSD symptoms some 8 years ago. She has been subjected to two upper sympathectomies in the second and again in the fifth year of symptoms and now she suffers RSD symptoms in 4 limbs, plus her chest, including her heart diaphragm—her blood pressure is currently 60/30 and she is barely functional. No other member has been subjected to sympathectomy but all have had multiple sympathetic blocks without cure.” (Unrequested letter to the author from a Chapter of the RSD Society, USA).

CONCLUSION

Many patients throughout the world experience or communicate chronic pains associated with positive or negative symptoms of sensory and motor dysfunction. Vasomotor and sudomotor phenomena may be present. As in several other areas of medicine, all these symptoms, and even the objective “autonomic” changes, may be caused by either organic or psychiatric disease of the nervous system. The second category amounts to a bona fide disorder of brain function in the realm of conversion-somatization. In addition, as in all other areas of medicine, these symptoms may

reflect fraud schemed by patients who consciously pursue some material gain. As with any kind of clinical neurological profile, the neurologist is best qualified to assess its medical nature. Aided by precise physiological laboratory tests, the specialist should be able to issue and defend a diagnosis of radiculopathy, plexopathy, mononeuropathy, or polyneuropathy. Physicians without expertise in neurology are at a disadvantage when it comes to eliciting and interpreting the symptoms, signs, and test results from these patients, even when these might relate to obvious organic disease of the peripheral nervous system.

Regardless of specialty, physicians who assess patients displaying pseudoneurological sensory or motor phenomena associated with chronic pain of apparent neuropathic origin will predictably be misled under two circumstances:

- a) when elicitation and interpretation of the history, physical, and neurological examination of the patient are superficial or inexperienced, and miss telltale features that are atypical for organic neuropathy but typical for the symptomatic cartoon displayed through the somatoform process. A pertinent pseudoneurological analog occurs with pseudoseizures, an event that no clinician could be unfamiliar with;
- b) when the clinician is unaware of the huge incidence of somatization in clinical practice, and of the fact that the profile of apparent somatic disease generated by a dysfunctional brain is a poor imitator of organic neurological illness. In this context, the term “pseudoneurological illness” (Shorter, 1995) does optimally reflect a colossal “blind spot” in clinical medicine (Quill, 1985).

When faced with a patient with pseudoneurological illness, the unaware physician, after becoming perplexed by negative results of laboratory investigations launched for testable hypotheses, fatally issues diagnoses that emanate from folk medicine. In absence of gold-standard tests for validation, such hypotheses cannot be formally rejected and thus become inextricable diagnostic labels that make the patient a chronic medical entity and permanent client. Whereas common sense and scientific standards dismiss such aberrations, in the realm of chronic pains associated with sensory, motor, and vasomotor phenomena, an unfortunate situation often prevails. The naive physician becomes persuaded, and thus persuades the patient, that subjective improvement of the pain or sensorimotor phenomena following a ritualistic intervention (“diagnostic block”) provides decisive evidence to support that a clinical profile, unexplainable through the laws of anatomy or physiology of the

nervous system is controlled by the autonomic sympathetic system. Were it not for the entrepreneurial power of the sympatholytic industry, such absurd misconception would have been eradicated years ago, when it became known that the subjective relief is explained through the placebo effect.

Since most patients with pseudoneuropathic chronic pains do harbor a genuine health disorder centered in the psyche within their brains, and since many of them should be potentially treatable through specific endeavors, it becomes mandatory to protect patients from the iatrogenesis they receive on the basis of mythological adjudicated diagnoses. Unfortunately, many psychologists (but only underqualified psychiatrists) fallaciously write off the ostensible psychopathology as “secondary to RSD (or CRPS).” After the patient with psychogenic pseudoneuropathy—a double victim of a stressed brain and of the medical profession—who must be zealously protected from iatrogenesis, it is necessary to also protect the ad hoc scapegoat appointed as having caused the inexistent somatic disease, one which is usually misprognosticated as progressive and incurable. Typically, the scapegoat is unassailable: the workers’ compensation system, motor vehicle insurance companies, or medical malpractice insurance companies. Inadvertently, scientists who promote gross animal models of nerve injury as universally valid descriptions of “neuropathic pains” not only illegitimize the huge population of patients expressing psychogenic pseudoneuropathy, a disorder that understandably falls within the medical blind spot, but also reinforce the fallacy or tertiary-gain agenda of the newfound experts. To quote the most seasoned neurologist in America, “Time has come for the good guys to speak against the bad guys” (Landau, 1997).

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