research providing evidence that dura mater does not represent a mere covering to the central nervous system. The evidence provided by the authors is that CSD reduces blood flow in the dura mater and the hypothesis is that such reduction reflects metabolic changes in the brain via connections between cortical and dural blood supplies. The relevance of the finding is the possible activation of nociceptive fibers in the dura mater. In 1993, Piper et al. (1) reported no increase in CGRP plasma level from the cephalic circulation following CSD in the cat. Those findings suggested that CSD per se was not a sufficient trigger factor for CGRP release from trigeminovascular fibers. Nevertheless, as quoted by Lambert and Michalicek in the present article, CSD in the rat was sufficient to increase c-fos expression in trigeminal nuclei, an increase that was secondary to trigeminal fiber activation (2).

Changes in dural blood flow described herein were not critical; however, they might be enough for stimulation of the trigeminovascular system. Orthodromic stimulation might increase c-fos expression in brainstem trigeminal nuclei, whereas antidromic stimulation might induce neurogenic inflammation in peripheral tissues.

The data in the article indicate an interesting link between physiological events in the brain and its “capsule”. At the present time, however, clinical evidence for such events in humans is lacking. Furthermore, as recently reviewed by Lauritzen (3) the role of CSD in migraine remains theoretical.

REFERENCES


M Gabriella Buzzi

Nitric oxide in cerebral vasodilation and headache

The report by Iversen and Olesen in this issue of Cephalalgia adds to a growing body of literature which implicates nitric oxide (NO) as an important neurovascular mediator. The authors conclude that NO is the major mediator of both the pain and vascular changes accompanying the administration of nitroglycerin, based on the finding that the H₁ receptor antagonist mepyramine does not block the headache nor the vasodilation following nitroglycerin administration. The findings extend the results of two prior publications in experimental animals which show that NO induces release of sensory neuropeptides from trigeminovascular and other sensory afferents. In 1992, Wei et al. found that vasodilator responses to topical nitroprusside and nitroglycerin were markedly depressed after trigeminal denervation of pial vessels (1). When CGRP [8–37], a selective CGRP₁ receptor antagonist, was topically applied to normal pial vessels, the dilation to topical sodium nitroprusside was significantly attenuated. More recently, Holzer and Jocic found that CGRP [8–37] blocked the hyperemia caused by intraplantar infusion of sodium nitroprusside, an NO donor (2). They also noted that the NO synthase inhibitor, L-NAME blocked vasodilation following application of the noxious irritant mustard oil to the skin, but failed to block the vasodilation accompanying CGRP administration. Together, both experiments and those recently reported by Hughes and Brain suggest that NO donor activate sensory nerves to release vasodilator amounts of CGRP in the cephalic circulation (3).

In addition to actions on perivascular primary afferent fibers, NO alters processing of nociceptive information within the central nervous system. This information has recently been reviewed and suggests multiple sites in which NO can modulate synaptic activity and pain transmission (4). The relative importance of NO with respect to its central and peripheral effects will be quite challenging to study in the human, but equally worthwhile.

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Michael A Moskowitz, F Michael Cutrer

The blink reflex and muscle tenderness in tension-type headache

In the last few years, a number of different reflexes in connection with headache have been analyzed. Many reflex examination methods have not been widely used, however. It is apparent that clinical utility is impractical or of limited relevance in the analysis of headache. Brainstem reflexes have proved interesting, however. Reflexes which have previously found little clinical use, such as the exteroceptive suppression of temporalis muscle activity, have proved to be exceptionally revealing both in differential diagnosis and in the analysis of headache pathophysiology. The electrically triggered blink reflex
already had an established place in the clinical analysis of brainstem function. Whether this reflex may also be of relevance to headache is explored in a preliminary pilot study by Sand et al. in this edition of Cephalalgia. Eyelid closure is bilaterally connected and serves as a protective reflex. The afferents and efferents of the two components and their synapses in the brainstem are well known. Certain reflex loss patterns can be related to localized damage in the brainstem. In addition to reactions to single stimuli, habitual flow studies can also provide information on pharmacological and toxic effects. A very important result presented in the study by Sand et al. is that people suffering from cervicogenic headache, chronic tension-type headache or migraine show no essential differences in the behavior of the blink reflex, either among themselves or compared with control people without headaches. The present study does not suggest any damage within the connection pattern of the blink reflex in the headache symptoms studied. Because the groups were relatively small, the intra-individual differences should be interpreted with care, however. The study also demonstrates, by the example of age, that reflex analyses are influenced by a number of variables and that results should only be interpreted after careful controls of such variables.

Under tension-type headache, the International Headache Society classification distinguishes a type with normal and increased pain sensitivity of the pericranial musculature. In the classification manual it is explicitly noted that this subdifferentiation is preliminary and not yet sufficiently corroborated by empirical studies. The primary aim of the subdifferentiation is the stimulation of new research as a means of classifying the pathophysiology of this widespread form of headache. The study by Sandrini et al. complies with this demand, and for the first time in the literature the three most important methods for determining pericranial muscular disorder, viz. surface EMG, algesimetric methods and manual palpation, have been systematically compared. Without an exact evaluation of the examination methods there is, in principle, a danger that myalgic sensitivity is missed or that pain hypersensitivity is diagnosed by mistake. Thanks to this study, the diagnostic sensitivity of the different examination methods can be determined and compared. If the pain sensitivity of patients with tension-type headache is generally increased, a subgroup differentiation would be superfluous. But, as the study by Sandrini et al. confirms, approximately half the patients have normal function while the other half has increased myalgic sensitivity. This study then, as have other studies in the past, supports the subdifferentiation given in the IHS classification. The selectivity of the different methods varies considerably, however. Depending on the method applied, the quota of patients lies between 0% and 59%. The study therefore indicates very clearly that a standardized operationalization of myalgic sensitivity is urgently needed to make a reliable subdifferentiation possible.

H GOBEL

Benign paroxysmal vertigo of childhood: a long-term follow-up

Benign Paroxysmal Vertigo (BPV) of Childhood is a topic that has been discussed and debated since its classic description by Basser in 1964 (1). Lanzi and colleagues, in this issue, briefly review some of the distinguishing characteristics of this rare disorder, particularly in contrast to "migrainous" vertigo (MV). They go on to describe data from a pool of seven pediatric subjects, age 2.0 to 4 years at the time of onset, whom the authors followed for periods of between 2.6 and 15.7 (mean 8.9) years. Each of the subjects included in this study had the clinical manifestations of BPV at the time they entered into the investigation. The long-term follow-up included monitoring the symptoms associated with BPV in childhood (i.e., headache, signs of atopy, vomiting, limb pain, idiopathic recurrent fever, and kinetosis). The authors found that BPV remitted spontaneously for five of seven subjects, and that all but one subject had headache at the time of follow-up.

This study is an important contribution to the literature on BPV of Childhood because of the long-term nature of the follow-up. The authors concluded that, although the clinical presentation of "classic" BPV differs from that of "atypical" MV of later onset, BPV of childhood appears to be closely related to migraine. Specifically, headache was present in only one subject at the time of onset yet was the primary symptom in most subjects at the time BPV resolved. Accordingly, the authors suggested that vertigo is a migraine precursor in "classic Basser" patients. It may be a migraine equivalent in "migraine vertigo" patients. They postulated that the mechanisms of BPV attacks and migraine may be similar and proposed exploring the role of psychological factors in the pathophysiology of BPV. Certainly, the data support the need for additional controlled studies to address the remaining diagnostic and treatment questions regarding this population.

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