Invited Comments

Increased body temperature at stroke onset is a poor prognostic factor. In patients with spontaneous supratentorial intracerebral hemorrhage, the duration of fever is associated with poor recovery and seems to be an independent predictor of outcome. There is a considerable body of evidence based on experimental studies showing that increased body temperature when present during or after a period of acute stroke exacerbates the degree of resulting neuronal injury. Temperature has a significant influence on intracerebral metabolism. Hyperthermia increases the release of excitatory neurotransmitters (glutamate, gamma-aminobutyric acid, and glycine) and oxygen free radicals, causes more extensive blood-barrier breakdown, impairs recovery of energy metabolism via increased enzymatic inhibition of protein kinases and worsens cytoskeletal proteolysis, all proposed mechanisms of late neuronal death, mainly in the ischemic penumbra, the site where temperature-dependent stroke progression occurs. In addition, it seems that hyperthermia exaggerates the development of brain edema in patients with intracerebral hemorrhage. A recent meta-analysis[1] showed that both morbidity and mortality were significantly higher in pyrexial than apyrexial stroke patients, confirming that hyperthermia within the first 24 hours of stroke onset is associated with significantly greater morbidity.

Infections (mainly of pulmonary and urinary sources), thrombophlebitis, and drug reactions are the most frequent causes of hyperthermia in patients with stroke. “Central” or “neurogenic” fever is another potential etiology. Direct damage to the thermoregulatory centers in the hypothalamus and brainstem has been reported as the cause of severe hyperthermia in experimental models. The mechanical irritation of the hypothalamic thermoregulatory centers by the intraventricular blood can also produce hyperthermia and may account for the high incidence of fever after supratentorial intracerebral hemorrhage, especially in patients with ventricular hemorrhage.[2]

The study of Deogaonkar et al shows that in patients with intracerebral hemorrhage, the presence of fever correlates with “third ventricular shift”, suggesting a role of hypothalamic compression as a cause of “central fever”. This study also confirms a higher mortality rate and a trend towards a worse neurological outcome in patients with hyperthermia.

Hyperthermia, independently of its cause, may aggravate the outcome of stroke patients and should be promptly reversed with appropriate antipyretic agents. Lowering temperature in febrile stroke patients is at least as important as antimicrobial treatment in case of infection. Body temperature should be maintained in a safe normothermic range (e.g., between 36.7°C and 37.0°C) for at least several days after stroke onset.

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References