Guest Editorial

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Head Injury: The Relentless Enemy

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"There is no evidence that the efforts expended since 1950 to popularize the newer methods of treatment have resulted in any meaningful reduction in mortality of these patients".

Lancet 1978

More than four decades ago when we published our monograph, "Diagnosis And Surgical Treatment of Severe Cranio-Cerebral Injuries"[1], the Lancet considered it a significant contribution and published an annotation. It commented, *" The treatment of severe head injury is clearly becoming less the province of inactive masters (Lancet, Feb 18, 1961) that it has been hitherto".* One of the revolutionary advances that helped in dispelling the masterly inactivity and at the same time replace the invasive and the time consuming cerebral angiography was the introduction of CT scan. Intracranial hematomas can now be diagnosed promptly and reliably, without waiting for signs of clinical deterioration. This resulted in significant reduction in mortality from these lesions. However, critical analysis of more than two decades of our concerted efforts at AIIMS, New Delhi, along with a detailed review of the available literature, presented as my Presidential address at the Thirty Fifth Annual Conference of the Neurological Society of India held at Patna in December 1985, revealed some improvements in the outcome of treatment of severely head injured patients but also indicated at these "still leave much to be desired"[2]. In the intervening years the masterly activity of earlier years had given place to the so-called, "Aggressive Management" consisting of intracranial pressure monitoring, artificial ventilation, therapy for reducing ICP (variety of regimes using diuretics, corticosteroids, barbiturates etc.) [3,4,5,6]. Notwithstanding all these measures, the overall mortality and morbidity remains unacceptably high. An independent evaluation of two comparable series, managed with and without such "heroic" measures surprisingly revealed that except for a small group pf patients the so-called "aggressive" treatment failed to provide additional benefits compared to the conventional management[7]. Unfortunately, neither our study nor any other could define the indicators to determine those few who are likely to benefited. As a matter of fact some of these practices came to be recognized as unphysiological, if not undesirable[8,9,10].

Advances in molecular biology from 1980s onwards aroused fresh expectations that better understanding of the cascade of molecular events responsible for adverse secondary events set in motion by the initial impact may help in planning better therapeutic strategies based on scientific data. An explosion of experimental studies evaluating the role of initial hypoxia, hypotension, anemia, cerebral circulatory disturbances – vasospasm, ischemia, hyperemia, failure of autoregulation of cerebral blood flow, release of free radicals, free fatty acids, excitatory amino acids and other vasoactive substances in causation of the secondary events pointed to new therapeutic targets. These studies have been summarized in our publications[11,12,13].

It become obvious that prompt resuscitation and restoration of blood pressure, ventilation (not hyperventilation) to maintain normal oxygen and CO_2 levels (not aiming of lower levels of pCO_2), euvolemia to a CVP of 8-10, maintenance of cerebral perfusion pressure greater than 70 mm Hg, mild hypothermia helped to reduce the incidence and severity of the secondary insult.

A paradoxical situation seemed to have arisen in respect to the neurochemical events associated with or most likely responsible for these secondary events. Thus, use of competitive or non-competitive NMDA antagonists to counteract the excitotoxic insults, free radical scavengers, calcium channel blockers, glucocorticosteriods which proved to be beneficial in experimental animals failed to demonstrate such benefits except in some patient groups[14]. Therefore, many strategies for neuroprotection enthusiastically adopted on the basis of animal experiments failed to live up to their promise.

Faced with this dilemma the National Institute of Neurological Disorders and Stroke (NINDS), USA, recently sponsored a workshop that brought together neurotraumatologists from clinical, research and pharmaceutical backgrounds to explore the reasons for the paradox and help in planning and design of future research.

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Every one interested in neurotrauma is strongly recommended to read the exhaustive remarkably honest proceedings of this workshop[15]. This report highlights the methodological and conceptual flaws of most of the promising reports whose investigators-the whose who of neurotraumatology-participated in this workshop. The workshop acknowledged the lack of clinical benefits from any of these therapeutic measure(s) either singly or in combination. It is not a matter of any vicarious satisfaction that our own modest clinical studies had predicted the same more than a decade earlier.

This is not to say that there have not been any gains in overall care and outcome of the unfortunate victims of head trauma during these years. The maximum gains, however, have been the result of use of helmets and seatbelts to minimise the impact of injury, improved pre-hospital care, supportive therapy during transportation, prompt emergency room resuscitation, availability of non-invasive, rapid and reliable means of diagnosis permitting early evacuation of intra cranial haematoma and expert ICU care. Unfortunately, even these measures of proven benefit are still not available outside a few major centers in the country. This is all the more regrettable considering the number of lives lost and the even larger number of those surviving with physical and psychological disabilities. It is noteworthy that India has the unique distinction of having the highest number of accidents per 1000 vehicles (31.8 compared to 12.20 in USA), highest number of death per 1000 vehicles (2.50 compared to 0.25 in the USA). At the same time the total number of persons killed in road traffic accidents, the major cause of head injury has progressively risen from nearly 14,000 in 1970 to 54,000 in 1990. A recent newspaper report predicted a further increase to 80,000 for the year 2004. If even one tenth of this number died from an infectious disease there would be a national hue and cry. Yet most of us, including medical persons in general accept it as inevitable. It is equally regrettable that in spite of the creation of the Neurotrauma Society of India a concerted effort to arouse the awareness of public health care manmanagers, civic authorities and policy makers is lacking. We have not succeeded in making use of helmets by two wheeler-motorized vehicles compulsory all over the country. Facilities for resuscitation at the site of accident and prompt supervised transportation are rarely available. The unparalleled opportunity for indigenous research efforts in this field are also woefully inadequate. Let us hope that the Indian Journal of Neurotrauma will stimulate all concerned to effectively deal with this national tragedy. The real worth of the neurosurgical unit should not be judged by the results of their surgical achievements in successfully evacuating an extradural haematoma but by its efforts in preventing head injuries to occur. Our generation obviously failed the test but hopefully the current generation would succeed.

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