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Intracranial pressure waveform indices in transient and refractory intracranial hypertension

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Abstract

Analysis of data obtained by continuous computerized monitoring of intracranial pressure (ICP) in 109 adult patients with severe head trauma was performed to examine the patterns of change in indices of the ICP waveform. Indices derived from direct measurement of the ICP wave and obtained from a Fast Fourier Transform (FFT) were examined. Concurrent physiologic measurements were made. Two types of intracranial hypertension (ICH) were defined for comparison. $\hat{\sim}$ Transient intracranial hypertension $\hat{\sim}^{\text{TM}}$ occurred when an abrupt rise in ICP was followed by a return to below 25 mm Hg ($n = 63$). Increases in ICP that were progressive and led to neurologic deterioration and death were termed $\hat{\sim}$ refractory intracranial hypertension $\hat{\sim}^{\text{TM}}$ ($n = 18$). During transient ICH heart rate, arterial pressure, end-tidal carbon dioxide and

jugular venous oxygen saturation all increased, while these measures either were unchanged or decreased during refractory ICH. The pulse amplitude of the ICP wave increased in both types of ICH. Other changes in the waveform indices were consistent with this change in pulse amplitude. HFC responded differently to the two types of changes, with an increase during the transient changes and a decrease during the refractory changes. The differences in changes in physiologic measurements as ICH occurred in the 2 groups suggest that in refractory ICH cerebral blood flow is maintained against the mounting ICP, while in transient ICH the hypertension is caused by an increase in cerebral blood flow. The waveform indices do not discriminate between the two types of changes.



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Keywords

Intracranial pressure; Head trauma; Intracranial hypertension; transient; Intracranial hypertension; refractory

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