Delayed cerebral ischemia diagnosis

Early prediction of delayed cerebral ischemia (DCI) after aneurysmal subarachnoid hemorrhage (aSAH) is essential to prevent infarction.

Initial radiographic severity of aneurysmal subarachnoid hemorrhage aSAH was independently associated with the occurrence of different complications during aSAH and its final outcome. The Hijdra sum score showed the highest diagnostic accuracy and robust predictive value for early detection of the risk of DCI, in-hospital mortality, and unfavorable outcome after aSAH [1)]

Local intraparenchymal neuromonitoring in the anterior cerebral artery/middle cerebral artery watershed area might detect the vast majority of delayed cerebral ischemias for all intracranial aneurysm locations, except for basilar artery aneurysms. In ACA and AcomA aneurysms, bilateral DCI of the ACA territory was common, and bilateral probe positioning might be considered for monitoring high-risk patients. Non-focal monitoring methods might be preferably used after BA aneurysm rupture [2)].

Early low CBF measurements and high lactate and lactate to pyruvate ratio may be early warning signs of the risk of developing Delayed cerebral ischemia (DCI). The clinical value of these findings needs to be confirmed in larger studies [3)].

Perfusion computed tomography

Perfusion computed tomography for delayed cerebral ischemia diagnosis.

Transcranial color-coded duplex ultrasonography

Transcranial Doppler (TCD) and transcranial color-coded duplex sonography (TCCS) are noninvasive modalities that can be used to assess vasospasm. However, high flow velocity does not always reflect DCI.

Quantitative electroencephalography (qEEG)

Quantitative electroencephalography for delayed cerebral ischemia diagnosis.

BIS Monitoring

Hernández-Hernández et al. evaluated the bispectral index (BIS) monitoring to detect delayed

cerebral ischemia (DCI) after aneurysmal subarachnoid hemorrhage (aSAH).

BIS monitoring was recorded during 25-120 min in two periods, within the initial 72 h (BIS1) and between days 4 and 6 (BIS2) from admission. The median for each exported BIS parameter was analyzed. Transcranial Doppler (TCD) sonography was simultaneously performed with BIS1 (TCD1) and BIS2 (TCD2) monitoring. A multivariate logistic regression model was built to identify the variables associated with DCI.

Sixty-four patients were included and 16 (25%) developed DCI. During BIS2 monitoring, significant differences were found in BIS value (left, p = 0.01; right, p = 0.009), 95% spectral edge frequency (left and right, p = 0.04), and total power (left and right, p = 0.04). In multivariable analysis, vasospasm on TCD2 (OR 42.8 [95% CI 3.1-573]; p = 0.005), a median BIS2 value <85 in one or both sides (OR 6.2 [95% CI 1.28-30]; p = 0.023), and age (OR 1.08 [95% CI 1.00-1.17]; p = 0.04) were associated with the development of DCI.

BIS value is the most useful BIS parameter for detecting delayed cerebral ischemia after aSAH. Pending further validation, BIS monitoring might be even more accurate than TCD [4)]

References

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