C-reactive protein for aneurysmal subarachnoid hemorrhage outcome

Ma et al. reviewed and published a meta-analysis that investigated associations of systemic inflammatory marker C-reactive protein (CRP) and white blood cell count (WBC) with the occurrence of delayed cerebral ischemia (DCI) and poor functional outcome after aneurysmal subarachnoid hemorrhage (aSAH). Pubmed, EMBASE, and CENTRAL databases were searched until November 30, 2019, selecting prospective and retrospective studies of patients with spontaneous SAH due to ruptured aneurysm. Outcome measures were occurrence of DCI, defined as new focal neurological deficit or a deterioration of consciousness; and/or a new infarct on computed tomography or magnetic resonance imaging that was not visible initially. Occurrence of poor functional outcome at follow-up were measured by modified Rankin Scale or Glasgow outcomes scale. Fifteen studies analyzing data of 3268 patients with aSAH were included. Meta-analysis revealed early increase in CRP was significantly associated with higher risk of occurrence of DCI (pooled OR 1.30, 95% CI 1.10-1.54; P = 0.002), whereas not with poor functional outcome (pooled OR 1.02, 95% CI 1.00-1.04, P = 0.052). No significant associations between early increase in WBC and DCI (pooled OR 1.13, 95% CI 0.95-1.34; P = 0.179) were observed, whereas increase in WBC was significantly associated with increased risk of poor functional outcome (pooled OR 1.17, 95% CI 1.07-1.28, P = 0.001). Early increase in blood CRP appears to correlate with DCI after SAH, while increase in WBC correlates with poor functional outcome. However, strong conclusion cannot be made due to the small study number, between-study heterogeneity and suspicion of uncontrolled factors. Whether early phase CRP and WBC may serve as prognostic markers for aSAH needs more investigation [1)].

In 2020 Lee et al. published that early serial measurements of CRP may be used to predict neurological outcomes of SAH patients. Furthermore, maximal CRP levels within four days post-SAH are significantly correlated with poor neurological outcomes [2)].

In 2015 Turner et al. published that early recording of C reactive protein may prove useful in detecting those good grade patients who are at greater risk of clinical deterioration and poor outcome in aneurysmal subarachnoid hemorrhage [3)].

In 2012 Juvela et al. published that CRP levels correlate with the outcome but do not seem to predict delayed cerebral ischemia or infarction after SAH [4)].

Romero et al. published that increased serum CRP levels were strongly associated with worse clinical prognosis in his study [5)].

References

1)

Ma X, Lan F, Zhang Y. Associations between C-reactive protein and white blood cell count, occurrence

of delayed cerebral ischemia and poor outcome following aneurysmal subarachnoid hemorrhage: a systematic review and meta-analysis. Acta Neurol Belg. 2021 Jan 9. doi: 10.1007/s13760-020-01496-y. Epub ahead of print. PMID: 33423218.
2)

Lee S, Kim YO, Ryu JA. Clinical usefulness of early serial measurements of C-reactive protein as outcome predictors in patients with subarachnoid hemorrhage. BMC Neurol. 2020 Mar 27;20(1):112. doi: 10.1186/s12883-020-01687-3. PMID: 32220241; PMCID: PMC7099821.
3)

Turner CL, Budohoski K, Smith C, Hutchinson PJ, Kirkpatrick PJ; STASH collaborators. Elevated Baseline C-Reactive Protein as a Predictor of Outcome After Aneurysmal Subarachnoid Hemorrhage: Data From the Simvastatin in Aneurysmal Subarachnoid Hemorrhage (STASH) Trial. Neurosurgery. 2015 Nov;77(5):786-93. doi: 10.1227/NEU.0000000000000963. PubMed PMID: 26280117; PubMed Central PMCID: PMC4605277.
4)

Juvela S, Kuhmonen J, Siironen J. C-reactive protein as predictor for poor outcome after aneurysmal subarachnoid haemorrhage. Acta Neurochir (Wien). 2012 Mar;154(3):397-404. doi: 10.1007/s00701-011-1243-7. Epub 2011 Dec 3. PMID: 22134501.
5)

Romero FR, Bertolini Ede F, Figueiredo EG, Teixeira MJ. Serum C-reactive protein levels predict neurological outcome after aneurysmal subarachnoid hemorrhage. Arq Neuropsiquiatr. 2012 Mar;70(3):202-5. doi: 10.1590/s0004-282×2012000300009. PMID: 22392113.