Clinical Significance of Cine PC MR CSF Flow Study in Cervical Stenosis: Preliminary study

Hye-Young Choi, *Myung-Hyun Kim, *Jun-Hyeok Song, Sun-Wha Lee
Department of Diagnostic Radiology & *Neurosurgery, Division of Neurology,
Ewha Medical Research Center, College of Medicine, Ewha Womans University

Purpose: The purpose of our study was to evaluate the changes and clinical meaning of cervical pericord cerebrospinal fluid (CSF) dynamics in pre- and postoperative state of cervical stenosis. We measured the various parameters on dynamic wave forms which made from cine phase contrast (PC) magnetic resonance (MR) CSF flow images and compared them with normal and postoperative follow-up images.

Materials and Methods: The MR images were obtained with 1.5T (GE Signa, GE Medical Systems, Milwaukee, USA) unit using the cine PC sequence with peripheral gating in 10 degenerative cervical stenosis (mean age years), 10 controls (mean age 30.4 years) and 5 postoperative patients. The signal intensities were plotted as wave forms at the level of the C5, C6 bodies and the disc level of C5-6 of the cervical pericord CSF spaces. The wave forms were analyzed for configurations, amplitude parameters (Vmax, Vmin, Vdif), and temporal parameters (R-S, R-SMV, R-D, R-DMV). The statistical significance of each parameter examined with paired t-test. Seven patients underwent anterior interbody fusion, the other three patients underwent laminoplasty. Immediate postoperative flow images were acquired in 5 patients.

Results: In 3 region of interests of stenotic patients, distinct reproducible configuration features were obtained at C5 and C6 body levels, but not at C5-6 interbody level. In controls, the diastolic phase was longer and deeper than systolic phase especially at C5 level, than C5-6 & C6 level. We could determine the statistically significant differences between control and cervical stenosis in temporal parameters, not in amplitude parameters. In preoperative flow images, the graph showed R-DMV shortening ($p<0.05$) at the prestenotic level, generalized curve distortion at the stenotic level(all temporal parameters changed significantly). There was no change in the wave representing poststenotic level. In postoperative flow images, there were R-SMV shortening ($p<0.05$) and restoration of flow wave representing improvement of cervical stenosis.

Conclusion: The analysis of cine PC MR CSF flow study may give us valuable points for determining the level and degree of obstruction on diagnosing the cervical stenosis, deciding the necessity of operation and also treatment effect by postoperative follow-up evaluation.