Plasma exchange is efficient for lowering anti-aquaporin-4 antibody titers in neuromyelitis optica

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Background and Objective: Neuromyelitis optica (NMO) is an inflammatory CNS disease associated with serum anti-aquaporin-4 antibody (AQP4-Ab). The symptoms of NMO are often severe and are often resistant to high dose intravenous methylprednisolone therapy (HIMP). Although plasmapheresis including plasma exchange (PE) after HIMP is known to be effective in some cases of NMO[1], there have been few reports that analyzed the effectiveness of PE in NMO. Therefore, we measured AQP4-Ab before and after PE to see if PE is effective for lowering AQP4-Ab.

Methods and Results: A total of 24 NMO cases received PE after HIMP during the period from January 2002 to October 2008 in the Department of Neurology, Tohoku University Hospital. Among them, complete medical records of 23 cases were available. After 1-3 courses of HIMP, oral prednisone was administered at 60 mg per day and tapered 10mg in every three days until 15-30 mg per day. PE was performed twice or three times a week, total 3-5 times with an interval of at least one day. The mean interval between HIMP and the first PE was 7 days (range 1-23). Each exchange replaced 1.8-3 liters of plasma (about one plasma volume) with same volume of 5% human albumin (Albuminar®). Serum fibrinogen level and IgG level were measured before each exchange. PE was postponed if fibrinogen level was less than 100mg/dl and was discontinued if IgG level was less than 150mg/dl. The mean of total exchange number in each patient was 3.6.

Serum AQP4-Ab titers were measured retrospectively by using a sensitive immune-fluorescence method[2] before and after PE in each case. In brief, AQP4 transfected human embryonic kidney cells were incubated with diluted serum, washed, and incubated with flourescein-conjugated goat anti-human IgG. Fixed cells were photographed with confocal microscopy and antibody seropositivity was scored through comparison to transfected cells not expressing AQP4.

Among 8 cases of PE, 7 PE sufficiently reduced AQP4-Ab titer even after HIMP therapy. The clinical improvement usually started to appear after one or two exchanges. Reducing AQP4-Ab seems to be relevant to the therapeutic efficacy. Low dose administration of oral prednisolone (10-15 mg/day) alone or with azathioprine (100 mg/day) after PE maintains the AQP4-Ab titer at low level.[1]

Conclusion: PE was effective in lowering the AQP4-Ab titers and oral prednisone maintained the lowering of the titers. HIMP + PE improved the symptoms of about 70% of NMO attacks.

References

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