

Introduction

IVH is a common affliction in adults, often seen in association with hemorrhagic stroke. The inflammatory response in CSF has never been systematically studied. We hypothesized that inflammatory response in CSF occurs after IVH and is exaggerated by higher volume of hemorrhage and infection.

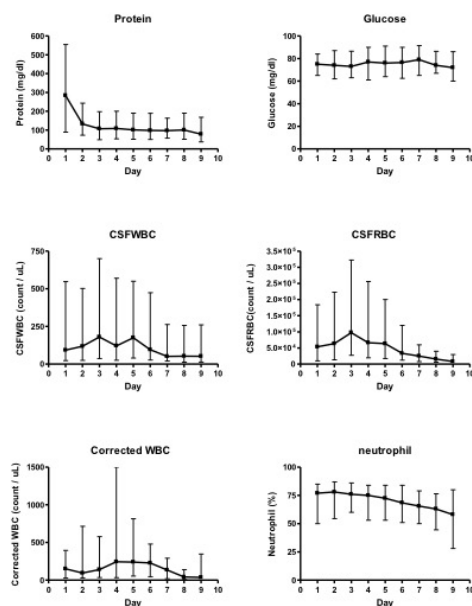
Methods

We analyzed prospectively collected blood and CSF data of patients enrolled in CLEAR III trial - RCT investigating outcome of intra-ventricular thrombolysis. Per trial design, blood and CSF are analyzed daily. The results, in chronological order, were utilized in our study. Corrected WBC count was calculated as CSF WBC – (Blood WBC x CSF RBC)/Blood RBC. Effects of infection and IVH volume were additionally examined.

Results

Cohort of 250 patients provided 6209 data points for ten days from ictus (Table 1 and Table 2). Due to paucity of values, days 0 and 10 were excluded from analysis. Also excluded were 21 values that were 3 SD over mean for each parameter, on individual days. Overall analysis showed WBC peak around day 3 with plateauing by day 7. RBC peaks similarly but declines steadily, without stability. Glucose showed no change throughout monitoring epoch (Figure 1).

Cohort median and individual parameter trend

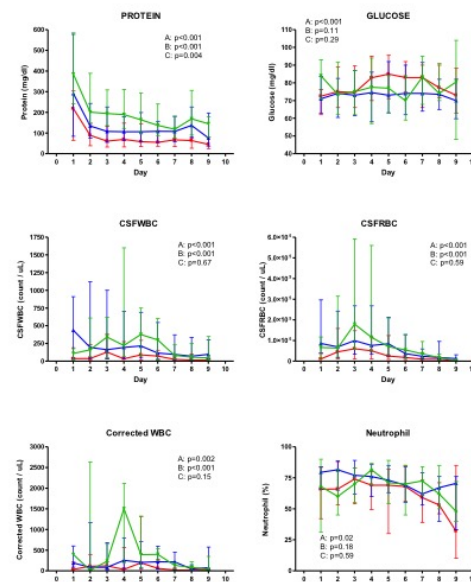


Initially high protein, WBC, and RBC counts decline rapidly but protein and WBC plateau around day 3 to 5.

There was significant positive correlation between IVH volume and CSF WBC, RBC and protein when comparing IVH volume <20 and 20-50 ml. Similar differences did not exist between IVH volume 20-50ml and >50ml (Figure 2).

Infection cases (n=10) consistently ran lower glucose levels than overall. CSF WBC, neutrophil and protein in infected cases also showed similar separation, often-preceding positive culture by days (Figure 3).

Stratification based on volume

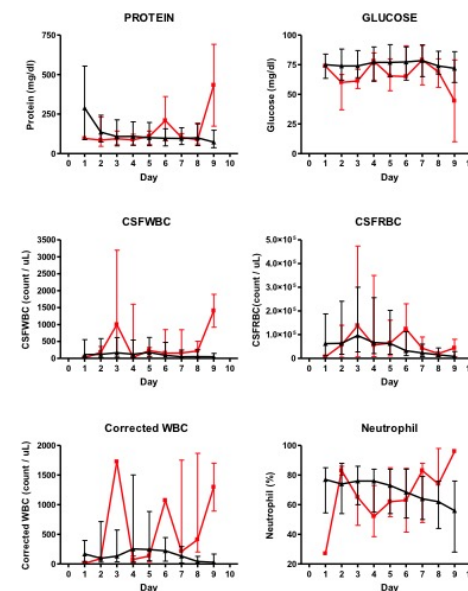


A - significance between IVH volume < 20 and 20 to 50 ml, B - between IVH volume < 20 and > 50 ml and C - between IVH volume 20 to 50 and > 50 ml.

Conclusions

This is the first prospective description of normal response to IVH, based on systematic surveillance. The response is greatest with higher IVH volume. Cases with infection showed separation in WBC, glucose and protein, from overall study group, but too few cases, and greater variability amongst them, prevents any positive predictions.

Comparison between culture proven infectious cases and non-infectious patients



Infection cases (red) show seapration in protein, glucose and WBC count from rest of the cohort.

References

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