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Retrospective Observational Case–Control Study Comparing the Effectiveness of Activated Charcoal and Resin Hemoperfusion on Treatment of Acute Paraquat Poisoning

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Objective: The aim of this study was to compare the effectiveness of activated charcoal hemoperfusion (ACH) and resin hemoperfusion (RH) on clinical outcomes of acute paraquat poisoning.

Methods: (1) This was a retrospective observational case–control study. Sixty-two patients with acute paraquat poisoning were enrolled. Thirty-four patients were treated with ACH and 28 with RH. Both groups received similar pulse therapy of methylprednisolone, cyclophosphamide, and other detoxification methods including gastric lavage, activated charcoal, and supportive treatment. Mortality was determined after 2 months after hospital discharge. (2) Study facilities: the RH group were treated with the Fresenius Medical Care 4008S machine with HA230 resin hemoperfusion cartridge and Rexeed L13 filter with enoxaparin used as anticoagulant; the ACH group were treated with an activated charcoal filter with the Prismaflex machine using heparin as anticoagulant. Urine paraquat concentration (UPC) was measured by the optical method.

Results: (1) The two groups were matched for age, male/female ratio, time from ingestion to local hospital, time from ingestion to first hemoperfusion, UPC, creatinine, aspartate aminotransferase (AST), alanine aminotransferase (ALT), total bilirubin, and PaO2. (2) 1.3±0.68 [1– 4] episodes of hemoperfusion were applied to patients in the ACH group, which was fewer than applied to the RH group with 2.5±1.29 [1–5] episodes (p=0.01). Following the first course of hemoperfusion, UPC decreased by 79.9±21.59 [49–100] with ACH and 87.1±17.26 [50–100] (%) with RH (p=0.294); there were no differences in UPC, AST, ALT, total bilirubin, and PaO2 between the two groups. Serum creatinine in the RH group (81.0±34.17 [35–165]) was lower than in the ACH group (111.4±59.91 [37–237] μmol/L), p=0.029. Platelets decreased by 53.6±14.37 [13–78] in the ACH group versus 31.9±20.53 [3–66] (%) in the RH group, and the difference in reduction between the two groups was statistically significant (p=0.0001). (3) The mortality rate was 25/31 (80.6 %) in the ACH group versus 12/25 (48 %) in the RH group (p=0.011). We did not have mortality data on six missing patients distributed amongst both groups.

Conclusion: A single episode of treatment with either ACH or RH decreased the UPC to a similar extent, but more time on RH was associated with a decrease in mortality in acute paraquat poisoning; the group treated with RH also clearly had a lower fall in platelet count than the group treated with ACH.