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P261 -Absolute transcapillary plasma refilling rate and its variability during haemodialysis

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Background: Achieving euvolaemia through ultrafiltration (UF) in haemodialysis (HD) patients while preserving haemodynamic stability presents a major clinical challenge. Transcapillary plasma volume refilling is considered pivotal in sustaining circulating blood volume during UF. However, absolute plasma refilling rates (PRR) and their determinants, and variability with UF rates, have not been studied.

Methods: We analysed 24 HD patients studied over two consecutive mid-week HD sessions. Plasma refilling was measured using real-time, minute-by-minute data obtained from the integrated blood volume monitoring module. A dilution approach was used to calculate absolute blood volumes. The first control HD session was undertaken with a conventional UF regimen required to achieve the prescribed target weight, whilst the second study session had a specific high UF rate (1L/hr) intervention, either in the first (n=12) or in the final hour (n=12) of the session. Participants' had their hydration status measured pre- and post-HD using multifrequency bioimpedance (BIS). Blood pressure was measured at 15min intervals and blood samples were taken at 6 intervals during HD sessions.

Results: The average PRR during a standard 4hr HD session was noted to be 5.2±2.9 ml/min (4.3±2.0 ml/kg/hr). PRR showed large interpersonal and intra-sessional variation (Figure 1). Refilling was low in the first hour of HD irrespective of standard (PRR= -0.8ml/min) or high UF (PRR= 1.2 ml/min). This was particularly true in the first 30 minutes due to an average time delay of 22 minutes (range: 13.3-35.0 minutes) from the initiation of UF to the onset of refilling. The maximum refilling occurred during the second hour of HD (average PRR max: 7.9±4.2 ml/min). UF rate (beta= 0.59, p<0.01) and BIS derived overhydration index (beta= 0.44, p<0.01) were consistent, independent predictors of PRR (R2= 0.66) in all HD sessions. Despite the variability in refilling patterns, no intradialytic haemodynamic instability was observed at the prevalent refill rates.

Conclusion: During HD, an average PRR of 5.2+2.9 ml/min, remained steady throughout the session following an initial lag period, and provided a stable intradialytic haemodynamic profile. Future UF strategies should be designed to match the measured plasma refilling rate and its variability to provide a more stable UF during HD.