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Case Studies

Asparaginase-associated concurrence of hyperlipidemia, hyperglobulinemia, and thrombocytosis was successfully treated by centrifuge/membrane hybrid double-filtration plasmapheresis

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Abstract: Asparaginase-associated concurrence of hyperlipidemia, hyperglobulinemia, and thrombocytosis is a rare complication requiring aggressive lipoprotein apheresis, but no one of currently available lipoprotein apheresis methods can simultaneously resolve the 3 abnormalities. Herein, we reported a construction of double-filtration plasmapheresis (DFPP) using a combination of centrifugal/membranous plasma separation techniques to successfully treat a patient with hyperlipidemia, hyperglobulinemia, and thrombocytosis. A male presented with severe hyperlipidemia, hyperglobulinemia, and thrombocytosis during asparaginase treatment for NK/T-cell lymphoblastic lymphoma and was scheduled to receive lipoprotein apheresis. To simultaneously remove lipoproteins, immunoglobulin, and deplete platelets from blood, a centrifuge/membrane hybrid DFPP was constructed as following steps: plasma and part of platelets were separated first from whole blood by centrifugal technique and then divided by a fraction plasma separator into 2 parts: platelets and plasma components with large size, which were discarded; and those containing albumin, which were returned to blood with a supplement of extrinsic albumin solution. DFPP lasted 240 minutes uneventfully, processing 5450-mL plasma. The concentrations of plasma components before DFPP were as follows: triglycerides 38.22 mmol/L, total cholesterols 22.98 mmol/L, immunoglobulin A (IgA) 15.7 g/L, IgG 12.7 g/L, and IgM 14.3 g/L; whereas after treatment were 5.69 mmol/L, 2.38 mmol/L, 2.5 g/L, 7.7 g/L, and 0.4 g/L, respectively. The respective reduction ratio was 85.1%, 89.6%, 83.9%, 39.4%, and 96.9%. Platelet count decreased by 40.4% (from 612×10^9/L to 365×10^9/L). Centrifuge/membrane hybrid DFPP can simultaneously remove lipoproteins, immunoglobulin, and deplete platelets, with a success in treatment of asparaginase treatment-induced hyperlipidemia, hyperglobulinemia, and thrombocytosis, and may be useful for patients requiring DFPP but with particular situations.

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Hyperlipidemia is a rare complication of asparaginase treatment, with an incidence rate of 0.9% as reported,[1] and usually requires no aggressive lipid-lowering therapies like lipoprotein apheresis.[2,3] Recently, we received a patient

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Table 1 Reduction ratio of blood components after centrifuge/membrane hybrid DFPP

Parameters	Before treatment	After treatment	Reduction ratio (%)
Total cholesterols (mmoL/L)	22.98	2.38	89.6
Triglycerides (mmoL/L)	38.22	5.69	85.1
High density lipoprotein (mmoL/L)	0.43	0.1	76.7
Low-density lipoprotein (mmoL/L)	1.86	0.5	73.1
apo A1 (g/L)	0.49	0.1	79.6
apo B (g/L)	0.88	0.5	43.2
apo E (g/L)	0.32	0.03	89.5
Albumin (g/L)	27.5	29.3	—
Globulin (g/L)	49.4	12.4	74.9
IgG (g/L)	12.7	7.7	39.4
IgA (g/L)	15.7	2.5	83.9
IgM (g/L)	14.3	0.4	96.9
Platelet (10^9/L)	612	365	40.4
Hemoglobin (g/L)	90	73	18.9

who took asparaginase for treatment of natural killer (NK)/T-cell lymphoblastic lymphoma and developed severe drug-resistant hyperlipidemia, with a concurrence of hyperglobulinemia and thrombocytosis, which greatly contributed to his hyperviscosity status. To improve his condition and start the postponed third chemotherapy as soon as possible, lipoprotein apheresis using double-filtration plasmapheresis (DFPP) system was prescribed to him. To simultaneously relieve his hyperlipidemia, hyperglobulinemia, and thrombocytosis, we combined centrifuge and membrane plasma separation techniques together to construct a novel centrifuge and membrane hybrid DFPP system and treated this patient successfully for one session, with a satisfactory reduction of blood levels of lipids, immunoglobumins, and a depletion of platelet.

Case report

A 50-year-old male was admitted in August 2014 to receive a planned third chemotherapy. He was diagnosed as

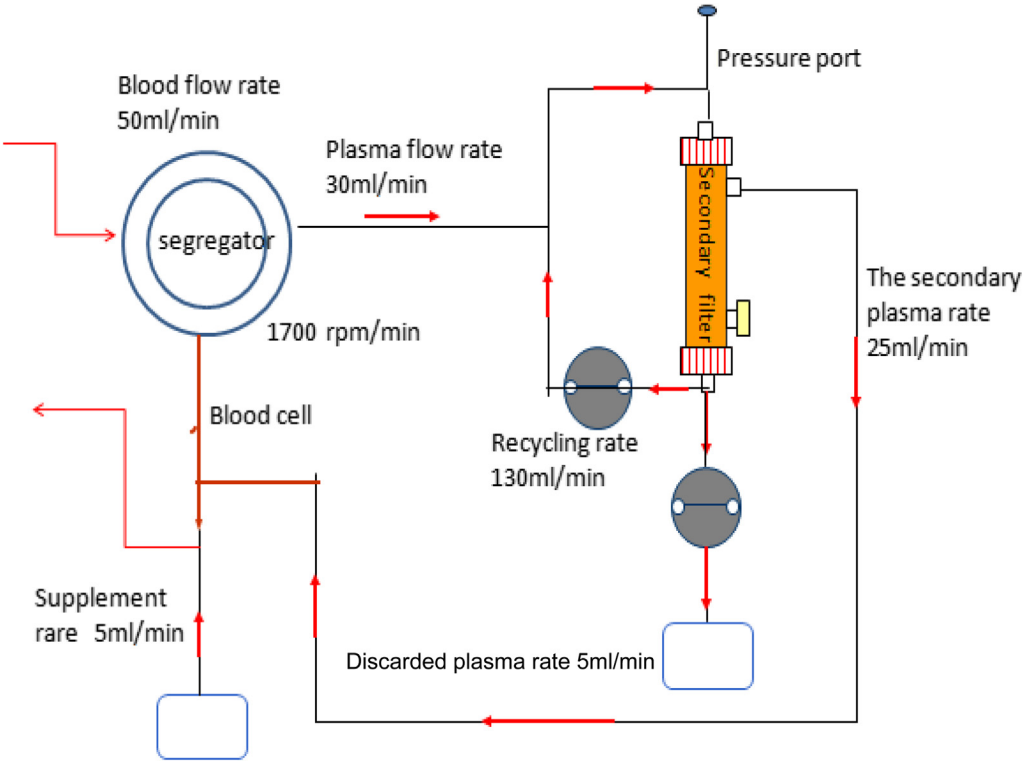

Figure 1 Schematic diagram of centrifuge/membrane hybrid double-filtration plasmapheresis.