Supplementary

Table S1 External bypass application methodology

Main contents	Methodology
Vascular canulations	1. Drainage from caval vein
	Percutaneous cannulation via femoral vein to IVC (most common), saphenous vein to IVC or internal jugular vein to SVC
	Direct cannulation after laparotomy/sternotomy into IVC, SVC or right atrium
	2. Drainage from portal vein
	Direct cannulation after laparotomy into portal venous trunk, superior or inferior mesenteric vein
	3. Drainage from hepatic vein
	Direct cannulation during hepatic transection into hepatic vein(s) of future liver remnant
	4. Return to venous vessel
	Percutaneous cannulation through axillary vein (most common), internal jugular vein or subclavian vein
	5. Return to arterial vessel
	Percutaneous cannulation through femoral artery to abdominal aorta (a minimal-invasive approach)
	Direct cannulation after sternotomy into ascending aorta
Circuit establishment	Step 1: connect cannulas to active pump system and use 3/8" connectors when needed
	Step 2: prime circuit with heparinized saline and remove air
	Step 3: coordinate with perfusion team for pump initiation
	Step 4: maintain flow rate usually at 2 L/min and adjust based on circulation parameters and organ perfusion requirements
Termination protocol	Step 1: remove vascular clamps sequentially after completion of planned surgery
	Step 2: assess hemodynamic stability
	Step 3: disconnect bypass circuit by withdrawing drainage perfusion cannulas sequentially
	Step 4: repair/suture vessel incisions or ligate if appropriate

Example (percutaneous femoral vein cannulation for IVC drainage): make longitudinal incision over saphenofemoral junction, isolate, and ligate saphenous vein distally, apply proximal vascular tourniquet, insert 16–20F venous catheter into IVC, flush with heparinized saline and clamp temporarily. IVC, inferior vena cava; SVC, superior vena cava.

Table S2 Total vascular exclusion methodology

Main approaches	Methodology	Notes
Hepatic TVE: caval-preserving TVE of the liver	Clamp portal triad and hepatic veins sequentially while preserving IVC flow, after nicely exposing hepatic veins	Maintains cardiac preload
		Prevents acute renal injury
		Reduces bleeding furtherly if short hepatic veins are dissected beforehand
Standard TVE: simultaneous hepatic and caval TVE	Clamp infrahepatic IVC, hepatic hilum and suprahepatic IVC sequentially, after mobilizing the IVC and liver	Cardiac and renal function must tolerate acute venous return reduction
		A test clamp is necessary to assess hemodynamic stability
Two-step TVE: caval cross-clamping after a standard TVE	Step 1: Perform standard TVE to remove the diseased liver and retrohepatic IVC tissue *en-bloc*, leaving a sufficient caval stump below the hepatocaval confluence	Cardiac and renal function must tolerate acute venous return reduction during first step
	Step 2: Obtain a cross-clamp of the retrohepatic IVC to complete caval reconstruction	A test clamp is necessary to assess hemodynamic stability before the first step
		Cardiac preload should be guaranteed by fluid management

IVC, inferior vena cava; TVE, total vascular exclusion.

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