

REVIEW

Living liver donor safety: Early postoperative considerations of living liver donation guidelines from the ILTS-iLDTG consensus conference

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Abstract

Living donor liver transplantation (LDLT) is a life-saving procedure for patients with end-stage liver disease. As its use expands worldwide, ensuring the safety and well-being of live liver donors (LLD) is of paramount importance. Published evidence on early postoperative complications after living donor hepatectomy—those occurring within 90 days of surgery—is limited, and standardized postoperative care protocols are lacking. The International Liver Transplantation Society (ILTS) and the International Living Donor Liver Transplantation Group (iLDLT Group) convened a consensus conference in Toronto in March 2025 to develop guidelines for the safe care of the LLDs. This manuscript details the recommendations on early postoperative considerations for the safety of LLDs developed by Working Group III (WGIII) of the Consensus Scientific Committee, using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system for assessment of recommendations, and the Danish model of consensus. WGIII addressed four key areas: (1) standardized postoperative care, (2) early biliary complications, (3) early postoperative liver dysfunction, and (4) early postdischarge follow-up. This report emphasizes the need for vigilant postoperative monitoring in specialized units, with access to experienced providers and defined clinical pathways. Structured clinical and psychosocial follow-up protocols, perioperative prophylaxis for surgical site infections and venous thromboembolism, and management of early biliary and vascular complications are discussed. These may help standardize care, reduce complications and improve short-term outcomes in LLDs.

Abbreviations: DVT, deep vein thrombosis; GRADE, Grading of Recommendations, Assessment, Development, and Evaluation; iLDLT, International Living Donor Liver Transplantation Group; ILTS, International Liver Transplantation Society; ISGLS, International Study Group of Liver Surgery; LDH, living donor hepatectomy; LDLT, Living Donor Liver Transplantation; LLD, live liver donors; LT, liver Transplantation; MARS, molecular adsorbent recirculating system; PHLD, posthepatectomy liver dysfunction; SCD, Supplementary Digital Content; US, ultrasound; VTE, venous thromboembolism; WGIII, Working Group 3.

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INTRODUCTION

Living donor liver transplantation (LDLT) is an important source of grafts for liver transplantation (LT) in many countries worldwide, allowing more patients with end-stage liver disease to receive this life-saving therapy.^[1,2] Live donors occupy a unique niche in modern medicine: healthy individuals who undergo major surgery for no personal benefit, but instead to radically improve the health of another individual. As such, the safety and well-being of live liver donors (LLDs), both short-term and long-term, remains a central priority to the transplant community. Living liver donation is not without risk: the mortality rate is estimated to be between 0% and 0.8%.^[3–5]

With expanding utilization of this technically complex and high-stakes surgical procedure, there is a universal need to standardize care pathways to lessen harm to donors and to improve their postoperative care. Despite increasing experience with donor hepatectomy, the literature specifically addressing best practices remains limited. To address this gap, the International Liver Transplantation Society (ILTS) and the International Living Donor Liver Transplantation (iLDLT) Group convened a consensus conference on Living Liver Donor Safety in March 2025 (Toronto, Canada). Convening an evidence-based consensus conference allows maximization of the limited data pool to identify optimal approaches that can be universally applied by programs across the world.

This manuscript details recommendations for best perioperative practices following live donor hepatectomy, with the goal of minimizing morbidity, identifying outliers during the recovery process and managing any complications that arise. Specifically, this consensus statement presents recommendations for optimal donor care and prevention, detection, and management of early complications occurring from postoperative day one through ninety after discharge from the index hospitalization. Four key domains are addressed: (1) standardized postoperative care, (2) detection and management of biliary complications, (3) management of liver dysfunction, and (4) post-discharge follow-up (Figure 1). Given the relative scarcity of donor hepatectomy-specific data, the recommendations are grounded in evidence from general hepatectomy and abdominal surgery, supplemented by expert consensus. All guidance is framed under the assumption that living liver donors are otherwise healthy individuals without significant comorbidities.

METHODS

Details regarding the Scientific Committee and Preparation for the Consensus Meeting, as well as the Consensus process, are available in the first report from Working Group 1 of the Consensus Conference and in the Supplemental Digital Content (SDC), <http://links.lww.com/LVT/B68>, of this article.

WGIII addressed donor safety in the early postdonation period (day 1 through 90 from the index operation). There were 4 clinically relevant questions that were identified, with refined subtopics:

Question 1: Which postoperative care elements should be standardized after living donor hepatectomy to maximize donor safety?—This question addressed early monitoring practices, antibiotic and thromboembolic prophylaxis and recovery pathways.

Question 2: How should early postdonation biliary and vascular complications be diagnosed and managed?—This question addressed early detection of bile leaks using laboratory and imaging approaches, as well as treatment options.

Question 3: How should liver dysfunction be managed in the early postoperative period in LLDs?—This question addressed the definition and treatment options for liver insufficiency and dysfunction, and the very rare need to consider transplantation.

Question 4: After discharge from the hospital, what are the standard practices for early (90 d) follow-up for donors?—This question addressed instituting a holistic follow-up plan, including laboratory evaluations, imaging, pain control, wound healing and psychosocial aspects of the donor.

Q1: Which postoperative care elements should be standardized after living donor hepatectomy to maximize donor safety?

Monitoring

Prompt identification and management of postoperative complications is critical to minimizing morbidity after live donor hepatectomy (LDH). A designated provider, such as a nurse practitioner, senior surgical trainee or staff surgeon, should always be available to promptly address hemodynamic or biochemical deviations. Close monitoring of physiologic parameters, including continuous cardiorespiratory monitoring and or frequent

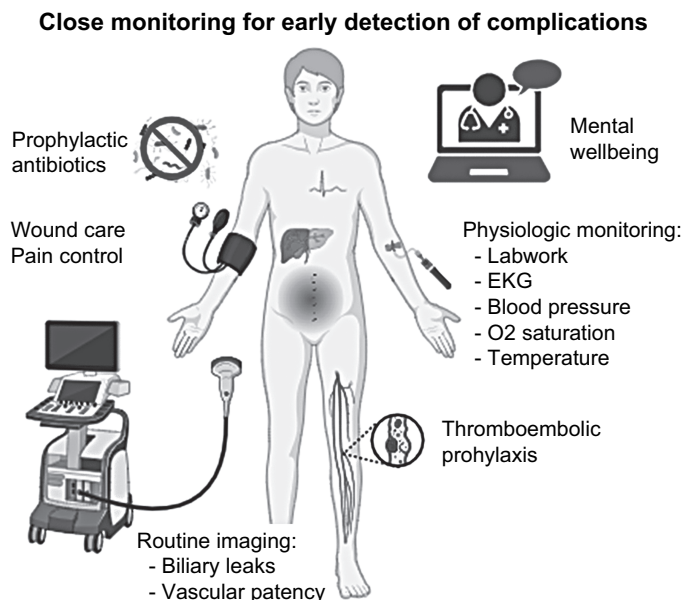


FIGURE 1 Living liver donors should be closely monitored to ensure early detection of complications and prompt intervention to palliate them.

vital signs and laboratory assessments in a specialized unit (intensive care unit or high dependency unit), enables early detection of complications and timely intervention.^[6–8] The required length of admission to these specialized units is not defined; however, most centers agree on 24–48 hours of admission for close monitoring prior to transfer to a regular ward.

Recommendations:

After surgery, all donors should be admitted to a unit staffed with experienced nurses with a low nurse-to-patient ratio. A responsible provider should be immediately available 24 hours a day. Continuous telemetry and/or vital sign documentation at least every 2 hours is beneficial in the immediate postoperative period.

Level of evidence: very low

Grade of recommendation: strong

Regular laboratory testing while in hospital should include a complete blood count, liver biochemistry tests (aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, total bilirubin), coagulation studies, electrolytes (including magnesium and phosphate) and creatinine. If concerning laboratory abnormalities are noted, adjustment of laboratory testing intervals may be beneficial.

Level of evidence: very low

Grade of recommendation: strong

Antibiotic use

Some randomized trials and meta-analyses support the use of standard perioperative antibiotic prophylaxis to reduce surgical site infections. Short-course antibiotic regimen (up to 2 d) has been shown to be as effective as prolonged antibiotics and may lower the risk of infections and antimicrobial resistance.^[9,10] All of these

studies were conducted in patients who underwent liver resection for either benign or malignant disease. Although these studies are relevant, there was a broad committee consensus that these populations, who have an underlying disease process, are not directly comparable to healthy living liver donors, for whom no specific studies currently exist. Adherence to guideline-driven, limited-duration antibiotic use is proposed.^[11] There are no recommendations for specific antibiotics as surgical prophylaxis for LLDs; these should be driven by local antibiograms and availability.

Recommendations:

Standard perioperative antibiotic prophylaxis is recommended as per institutional guidelines for major liver resection.

Level of evidence: low

Grade of recommendation: strong

Deep venous thromboembolism

Deep venous thromboembolism (DVT) prophylaxis remains variable amongst centers despite the recognized risk of DVT in LLDs during the perioperative period. A recent survey of 51 centers showed that 20 (39%) and 15 (29%) centers reported at least one perioperative deep venous thrombosis or pulmonary embolism event, respectively.^[12] Further, the risk of thromboembolic events is possibly underreported in literature due to most donor morbidity reviews generally classifying DVT or PE as a Clavien Dindo II complication without specifically categorizing the same^[13–17] (Table 1). Indeed, the risk of venous thromboembolism (VTE) and bleeding varies between different surgical procedures and underlying diseases.^[18] Most patients

TABLE 1 Incidence in the literature of deep venous thromboembolism or pulmonary embolism in live liver donors

References	Study type	No. patients	No. thrombotic events
Broering et al ^[13]	Single center, retrospective	165	1PE
Trotter et al ^[14]	Review of donor deaths	19	1 PE
Hall et al ^[15]	Multicenter, retrospective	2783	2 DVT
Yankol et al ^[16]	Single center, retrospective	890	2 PE
Mahamid et al ^[17]	Single center, retrospective	251	3 DVT

Abbreviations: DVT, deep venous thromboembolism; PE, pulmonary embolism.

undergoing hepatectomy are considered moderate-to-high risk for VTE (3.0%)^[19] based on the modified Caprini risk scoring system.^[20] The heterogeneity in the indications for hepatectomy and the underlying comorbidities makes this patient population not directly comparable to the LLDs, as these patients are younger and healthier and without an underlying disease process.^[21] Thromboelastography studies have shown that donors may remain hypercoagulable for up to 10 days postoperatively,^[15,16] indicating the importance of both mechanical and pharmacologic prophylaxis. Mechanical prophylaxis, such as intermittent pneumatic compression stockings and/or graduated compression stockings, should be continued until regular ambulation is established. Pharmacologic prophylaxis is initiated during hospitalization and continued postdischarge based on individual risk assessment and standardized institutional policies.^[18,24,25] This typically includes a regimen of subcutaneous heparin or low molecular weight heparin, with published literature not showing the advantage of one over the other in living donors^[26] (Figure 2). There is currently no data to support a specific length of pharmacological prophylaxis with anticoagulants post living donor hepatectomy, with substantial variability among center practices. Therefore, individualized approaches that take into account donor-specific risk factors as well as institutional practices are emphasized.

Recommendations:

Mechanical DVT prophylaxis should continue in the hospital until the donor is ambulating regularly. Pharmacologic DVT prophylaxis should be considered for all donors and maintained predischage and postdischarge based on preoperative risk stratification and institutional policies and guidelines.

Level of Evidence: low

Grade of recommendation: strong

Enhanced recovery after surgery

Enhanced recovery pathways have shown to improve outcomes especially with respect to length of hospital stay, readmissions, and early postoperative complications after major hepatectomy.^[27–30] However, there are no specific studies addressing these particular pathways in LLDs. Elements in the postoperative period include but are not limited to the items listed above, as well as standardized analgesia protocols which are mentioned in an accompanying manuscript.^[31,32] A risk-stratified approach supports safe recovery and aligns with the goal of standardized enhanced recovery protocols.^[30]

Recommendations:

All donors should participate in a standardized posthepatectomy recovery pathway to facilitate early recovery and optimize outcomes.

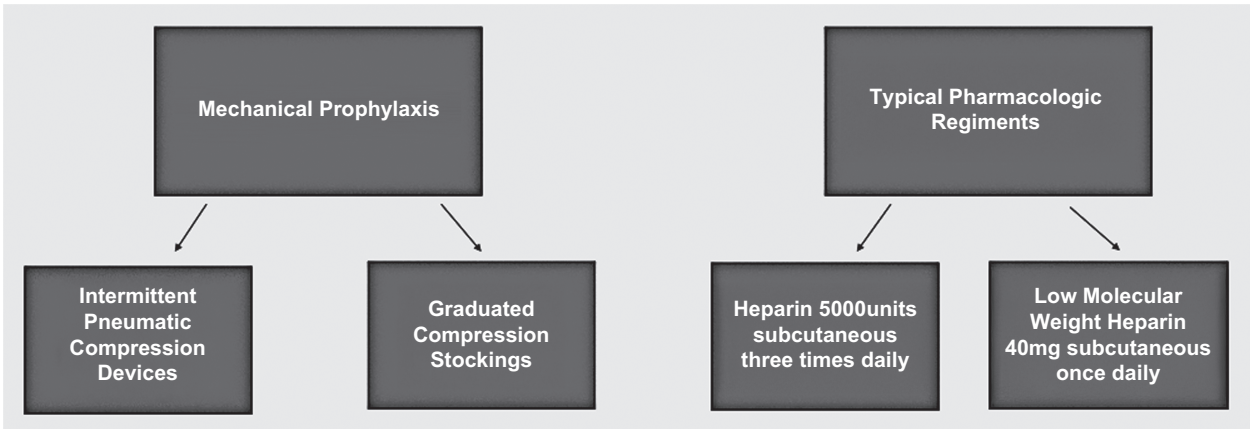


FIGURE 2 Approach to venous thromboembolism prophylaxis in the live liver donor.

Level of evidence: very low
Grade of recommendation: strong

Q2: How should early postdonation biliary and vascular complications be diagnosed and managed?

Although rare, biliary complications are among the most frequent serious postoperative issues following LDH. The biliary complication rate ranges from 2% to 15% depending on surgical technique, graft type (right vs. left vs. sectoral), and definition used.^[7,33–40] Bile leaks are more common and typically occur within the first few days to weeks after donation.^[33,36,41–43] Early identification of biliary complications is critical to minimize morbidity.

The International Study Group of Liver Surgery (ISGLS) defines postoperative bile leak as a drain bilirubin concentration more than 3 times the concurrent serum bilirubin level or radiologic evidence of a biloma with the clinical need for radiologic or surgical intervention.^[44] The biochemical threshold serves as a clear marker for early detection, but is functionally unhelpful, as the placement of surgical drains after donor hepatectomy is not a uniform practice, given the insufficient evidence to support routine placement.

Some centers perform a routine abdominal ultrasound (US) prior to discharge to screen for intra-abdominal collections, which may suggest bile leakage.^[35,41,43] Doppler US also allows to check for vascular integrity—biliary leaks can be linked to vascular compromise, so if a bile leak is suspected, ensuring normal hepatic blood supply and drainage is necessary. Furthermore, repeat imaging in the early postdischarge period may be warranted when vital signs, physical exam or liver biochemistry are persistently abnormal.^[35,41,42]

Low-output bile leaks may resolve with percutaneous drainage and adequate antibiotic coverage if the patient has no systemic symptoms.^[35,36,43] Persistent or high-output leaks, or signs of sepsis, warrant escalation to endoscopic retrograde cholangiography with stenting^[34,36] bearing in mind the rare but serious risks of post-endoscopic retrograde cholangiography pancreatitis and post-sphincterotomy bleeding. Given the goal of minimizing morbidity, there should be an appropriate threshold for intervention in this healthy population. Long-term outcomes are favorable when diagnosis and treatment are timely.^[33,35,38,40,43]

Abnormal liver tests (elevated total and/or conjugated bilirubin, alkaline phosphatase, and/or gamma-glutamyl transferase in particular) may be an early sign of biliary stricture. These may occur independently or as a result of an initial bile leak. They can result from surgical narrowing of the duct during stump

closure or an ischemic or inflammatory process. If there is a high clinical index of suspicion, further evaluation with cross-sectional imaging, such as magnetic resonance cholangiopancreatography, is recommended to assess for biliary narrowing and/or dilatation.

Vascular complications in the donor are rare and may include hepatic vein/caval stenosis or thrombosis, portal vein stenosis or thrombosis and arterial thrombosis or injury with development of a pseudoaneurysm. In the rare instance of donors presenting with ascites, persistently elevated lactate and/or refractory abdominal pain, immediate evaluation and imaging are required, as these may be attributable to an outflow or portal vein obstruction.^[45–47] As noted above, bilomas should also prompt assessment of the arterial system, as segmental arterial compromise may manifest primarily as a biliary leak. US Doppler for vascular indices followed by a CT scan is recommended to assess for any vascular issue (Table 2).

Recommendations:

If a surgical drain is placed during LDH, and the bilirubin level in the surgical drain exceeds three times the serum bilirubin level, it should raise suspicion of a bile leak.

Level of evidence: moderate

Grade of recommendation: strong

All donors should undergo an abdominal US before discharge to check for collections and vascular integrity. Additional imaging within three months is recommended.

Level of evidence: moderate

Grade of recommendation: strong

Donors with abnormal liver biochemistries, even if asymptomatic, should be evaluated for bile leak, biliary stricture and/or vascular complications using cross-sectional imaging.

Level of evidence: low

Grade of recommendation: strong

Percutaneous drainage alone is appropriate for low-volume bile leaks in living donors, with consideration of more invasive procedures (eg, endoscopic retrograde cholangiography) if this approach does not lead to resolution after several weeks or if there are undrained collections causing clinical deterioration.

Level of evidence: low

Grade of recommendation: strong

Q3: How should liver dysfunction be managed in the early postoperative period in LLDs?

Posthepatectomy liver dysfunction (PHLD) can be potentially fatal, with an overall incidence of approximately 8%, largely in the setting of hepatectomy performed for liver cancer.^[48] In 2011, the ISGLS

TABLE 2 Summary of key studies reporting early biliary complications in live liver donors

References	Study type	No. patients	Outcome/conclusions relevant to the question
Koch et al ^[44]	Consensus Statement	NA	Established ISGLS criteria for bile leak grading; defines bile leak as drain bilirubin > 3x serum bilirubin or need for intervention. Widely adopted in liver surgery literature.
Simoes et al ^[33]	Narrative Review	NA	Summarized bile leak incidence of 4–9% and stricture rates of 6%–10% post-LDLT; most leaks occurred early and were managed successfully with ERC and/or drainage.
Shin et al ^[34]	Narrative Review	NA	Reviewed 18 studies; bile leak rates ranged from 2.6% to 10.4%, with most cases treated with ERC + stenting or nasobiliary drainage. Emphasized early endoscopic intervention.
Tanemura et al ^[41]	Retrospective Cohort Study	N = 42 donors	Reported bile leaks in 4.8% (2/42); intraoperative bile duct injuries were managed with primary repair or drainage. Advocated careful duct handling.
Mathew et al ^[35]	Retrospective Cohort Study	N = 49 donors	Biliary complications occurred in 8.2% (4/49); bile leaks resolved with drainage or ERC. Recommended routine imaging prior to discharge.
Shin et al ^[36]	Retrospective Cohort Study	N = 827 donors	Reported 5.4% bile leak rate and 1.8% stricture rate. Most complications occurred within 30 d and resolved with endoscopic or percutaneous management.
Lei et al ^[42]	Abstract, Retrospective Cohort	N = 283 donors	Reported overall biliary complication rate of 7.8%; suggested intraoperative cholangiography and early imaging for detection.
Lei et al ^[37]	Retrospective Cohort Study	N = 300 donors	Observed bile leak rate of 6.3%; highlighted the importance of early diagnosis and minimally invasive treatment.
Pamecha et al ^[43]	Retrospective Cohort Study	N = 30 donors	Reported 10% bile leak rate (3/30); most resolved with drainage or ERC. Emphasized the need for structured follow-up protocols.
Ghobrial et al ^[38]	Multicenter Retrospective Study (A2ALL)	N = 392 donors	Bile leaks in 6.9% (27/392); most were managed with ERC or percutaneous drainage. Reoperation required in < 1%.
Shio et al ^[39]	Retrospective Single Center	N = 263 donors	Reported bile leak in 5.3% and stricture in 3.8%. All cases were managed conservatively or endoscopically with good recovery.
Abecassis et al ^[40]	Prospective Multicenter (A2ALL)	N = 760 donors	Reported bile leak rate of 6.8% and stricture rate of 1.7%; most were treated successfully without long-term sequelae.
Azoulay et al ^[7]	Retrospective European Single Center	N = 91 donors	Observed 9.8% bile leak and 3.3% stricture rates; all complications occurred early and resolved with ERC or drainage.

Abbreviation: ERC, endoscopic retrograde cholangiography.

proposed a standardized definition of PHLD as a postoperative deterioration in the liver's ability to maintain its synthetic and excretory functions, evidenced by an elevated international normalized ratio and hyperbilirubinemia on or after postoperative day 5, according to the normal cutoff levels defined by the local laboratory or versus the previous day if baseline was abnormal.^[49] Despite this effort, PHLD definitions remain inconsistent and unevenly applied across studies.^[50–57] Furthermore, the rate at which PHLD progresses to liver failure is unclear, particularly because of the challenges with varying definitions.

In the LLD population, clinically significant PHLD is rare, with an overall estimated incidence of 0%–26%, depending on the definition used and center experience/results (Table 3). In the absence of data from randomized controlled trials specific to LDH,

management strategies for PHLD are based on principles of care for acute liver insufficiency and failure: goal-directed support for organ dysfunction, treatment of reversible causes, infection control, and early institution of nutrition.^[58–62] Few interventions have shown clinical benefit in accelerating liver regeneration. N-acetylcysteine, though widely used, has limited supporting data,^[63] and remote ischemic preconditioning has not demonstrated improvement in liver function in LLDs.^[64]

PHLD severe enough to require LT is exceedingly rare for living donors. A global survey across 21 countries reported only 5 transplants among 11,553 hepatectomies (0.04%)^[65] and US data reported 3 cases requiring LT out of 4111 donors (0.07%).^[66] PHLD usually presents within the first few days following LDH, but liver failure secondary to PHLD

Table 3 Different definitions of posthepatectomy liver dysfunction (PHLD) in liver living donors in recent years

References	No. living donor hepatectomies	Definition PHLD	Incidence PHLD	Type of study	Type of hepatectomy
Fong et al ^[51]	349	Peak TB and peak INR PO	0.30	Prospective	Right lobe
Kim et al ^[52]	288	TB > 3 mg/dL + INR > 1.7 on PO day 5*	0	Retrospective	Right lobe
Radtke et al ^[53]	71	HE ≥ 2, TB > 5 mg/dL, INR > 2.2, ascites > 3L/d*	2.80	Case series	Right lobe
Choi et al ^[54]	1969	ISGLS definition (abnormal INR + TB on PO day 5)	10.80	Retrospective	Right lobe (80%)
Elshoubary et al ^[55]	434	ISGLS definition (abnormal INR + TB on PO day 5)	11.50	Retrospective of prospective database	Right lobe
Zuckerman et al ^[50]	604	INR ≥ 1.3 + TB ≥ 1.2 mg/dL on PO day 5	3.60	Retrospective of prospective database	Right lobe
Novruzov et al ^[56]	93	ISGLS definition (abnormal INR + TB on PO day 5)	26.70	Prospective	Right lobe
Mahamid et al ^[57]	42	INR ≥ 1.5 + TB ≥ 3 mg/dL on PO day 4	5	Retrospective	Left lobe

Abbreviations: INR, international normalized ratio; PO, postoperative; TB, total bilirubin.

may acutely or progressively worsen in subsequent weeks.^[65] Severe PHLD manifests with coagulopathy, hyperbilirubinemia, encephalopathy, hypoglycemia, and, in some cases, brain edema and death.^[61] Serum bilirubin levels exceeding twice the upper limit of normal, particularly if > 7 mg/dL, are associated with increased mortality.^[67]

Donors meeting acute liver failure criteria should receive the highest priority for transplantation.^[59,68] The transplant system has a fundamental duty to support these individuals in the event of severe complications. Transplant practices and emergency prioritization policies or access to deceased donor grafts vary widely across countries. Many programs worldwide have no standardized access to deceased donor LT and would utilize LDLT in the rare occurrence of donor liver failure. Nevertheless, the consensus strongly emphasizes that donors who develop severe posthepatectomy liver failure should receive the highest level of care and prioritization within respective transplant systems globally.

Supportive therapies such as the Molecular Adsorbent Recirculating System (MARS) have shown safety in early-phase studies, though the outcome benefit remains unproven.^[69–71] Bioartificial liver systems remain experimental and are unavailable outside clinical trials.^[72] At present, prevention through optimal donor selection and meticulous perioperative care is the most effective strategy to prevent PHLD and liver failure after LDH.^[61] In view of the lack of uniformity in the definition of PHLD and the scarce literature on the topic, no recommendations were made by the Consensus Group.

Recommendations:

Given the lack of uniformity in defining PHLD in LLDs and the scarcity of published evidence, no recommendations could be made by the Consensus Group. The Consensus emphasized the need for prospective studies in this area toward a unified definition, which could assess outcomes and direct management strategies in LLDs developing PHLD after donor hepatectomy.

Level of evidence: low

Grade of recommendation: strong

Q4: After discharge from the hospital, what are the standard practices for early (90 d) follow-up for donors?

The early postdischarge period is vital, and standardized donor postoperative pathways should be in place to ensure consistent longitudinal care. Follow-up should be individualized and influenced by the in-hospital course. Components include lab monitoring (particularly liver function), wound and pain assessment and psychosocial support. Published literature on this topic is limited and is primarily derived from

protocols focused on LLD outcomes and safety. Recommendations have been drawn more from expert opinion during the Consensus Meeting rather than evidence.

A 2010 retrospective study of 247 donors described a standardized follow-up consisting of physical exam, laboratory testing (liver function tests, bilirubin, complete blood count, coagulation studies, and renal panel) and mental health assessment.^[3] The timing of follow-up varies, with one retrospective multicenter study involving 456 donors reporting visits at 1 week, 1 month, 3 months, and then annually.^[73] Another study of 287 donors confirmed a similar frequency of laboratory assessments.^[74] If abnormalities in liver function tests or coagulation studies are detected, closer follow-up is recommended, including continued monitoring through the first postoperative week or until improvement is noted.^[75] Mental health, pain and quality of life assessments have been incorporated at discharge, 1 month, 6 months and 1 year in some studies.^[76]

Activity restrictions should follow general surgical standards. Return-to-work guidance should be individualized, with earlier return possible for less strenuous work. Two systematic reviews demonstrated that activity restriction in the early period does not reduce complications following abdominal surgery, including hepatectomy.^[77,78]

It is general practice in most LDLT centers that the donors are seen within a week of discharge from the hospital, and then at varying intervals during the first year, typically 1, 3, and 12 months after LDH. However, given the varying practices globally, the Consensus group thought it was not appropriate to dictate stringent practice requirements for early postoperative follow-up. This will have to be tailored to the particularities of each program, ensuring that the basic elements of early follow-up and appropriate monitoring. Long-term donor follow-up is addressed in detail by a separate manuscript submitted by WG4.

Recommendation:

A structured follow-up plan should begin within 7 days of discharge. This should include evaluation of liver function, wound healing, pain control, and psychosocial status. Follow-up frequency should be based on initial findings and comorbidities.

Level of evidence: very low

Grade of recommendation: strong

CONCLUSIONS

The early postoperative period is critical for optimal outcomes in LLDs after donor hepatectomy. To maximize donor safety, there must be a focus on in-hospital monitoring for the early detection of medical complications and PHLD, a standardized postoperative protocol with routine VTE prophylaxis, and a plan for

early follow-up upon discharge. Ensuring an optimal bridge from the intraoperative period till discharge, and the early postdischarge period, will allow for the highest level of safety for the LLDs.

AUTHOR CONTRIBUTIONS

All the authors participated in literature review, consensus conference discussion and voting, article writing and editing, and critical review. Amir Sayed Blayne, Marta Tejedor, Manikandan Kathirvel, and Ryan Chadha were working group coordinators. Sayed Blayne Amir and Tejedor Marta contributed equally to the writing of the manuscript and are co-first authors. Julie Heimbach and Nazia Selzner are joint senior authors.

CONFLICTS OF INTEREST

Mark Ghobrial consults for, received grants from, and has other interests in Sanofi. He has received grants from TransMedics and Eurofins. He owns stock in Eli Lilly. Roberto Hernández-Alejandro owns stock in HistoSonics. Cynthia Tsien is on the speakers' bureau for Lupin and has received grants from Astellas, Ipsen, and Gilead. Hiroto Egawa advises Junten Bio. Patrizia Burra consults for Ipsen, GSK, NovoNordisk, Sandoz, Chiesi Farmaceutici, Kedrion, and Biotest. Norah Terrault received grants from GSK, Bluejay Therapeutics, Siemens Healthcare, Hoffman-La Roche, Gilead, Vir Biotechnology, Helio Health, Durect Corp, Eiger BioPharmaceuticals, and ImmunoCore. She is employed by AASLD, Hepatitis B Foundation, and HBV Forum. She has other interests in Clinical Care Options, Simply Speaking, and Elsevier. Kim Olthoff advises OrganOx. The remaining authors have no conflicts to report.

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