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Comment on Portal Hemodynamics in Liver Transplantation

Do not Shunt The Large-For-Flow!

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We read with great interest the recent review by Rela et al on portal hemodynamics in liver surgery and transplantation.[1] In the following, we would like to highlight an important hemodynamic condition seen in transplantation using whole liver grafts that has not been mentioned in the review, namely large-for-flow.[2] This entity is defined by an impaired post-reperfusion portal flow (PF) normalized for graft weight and the published cutoffs range from <65 mL/min/100g to <80 mL/min/100g.[2–4] In a recent study from our group including 257 whole graft deceased donor liver transplantations (LTs) with routine perioperative hemodynamic assessment, a total of 16% of the recipients presented with a large-for-flow condition after reperfusion, and the latter was an independent risk factor for graft-related complications including primary nonfunction as well as impaired 90-day recipient survival.[2] These findings confirm data from previous studies showing a significant impact of large-for-flow on post-LT outcomes.[3–5] The pathophysiological mechanisms of large-for-flow are related to an overall hypoperfusion of the liver graft given the absence of a major compensatory increase in hepatic artery flow in case of a low PF.[6,7] Consequently, large-for-flow primarily causes parenchymal injury, translating into a high post-LT transaminase peak and an increased risk for primary dysfunction or nonfunction of the graft.[2,3] In contrast, during a small-for-flow condition encountered in partial grafts, there is an arterial hypoperfusion of the graft due to the hepatic arterial buffer response in the presence of an inappropriately elevated PF in relation to the graft weight.[1] This compensatory reduction in arterial flow exposes the recipient to an increased risk of post-LT arterial thrombosis and biliary complications.[3]

Large-for-flow has important clinical implications as it goes beyond the concept of large-for-size, which requires matching the anthropometric characteristics of the recipient to the weight of the graft.[8] Indeed, certain situations may require an additional perioperative hemodynamic matching by PF modulation to avoid a large-for-flow situation, especially in recipients with portosystemic shunts. For example, in the aforementioned study by our group, a total of 7 recipients were within the criteria for large-for-flow (median PF after reperfusion: 54.9 mL/min/100g) in addition to presenting a major portosystemic shunt.[2] Perioperative shunt ligation in these 7 recipients allowed for a 1.4 to 2.4× increase in normalized PF reaching a median PF of 80 mL/min/100g.[2] Importantly, none of these grafts were within the large-for-size criteria (graft-recipient weight ratio range: 1.4%–2.4%).

In summary, we congratulate Rela et al[1] for their comprehensive review on the importance of portal hemodynamics in LT. In addition to partial LT grafts exposed to the risk of small-for-flow, the concept of large-for-flow seen in LT of whole grafts adds to the importance of routine perioperative hemodynamic assessment to guide selective portal inflow modulation (Fig. 1).[2]

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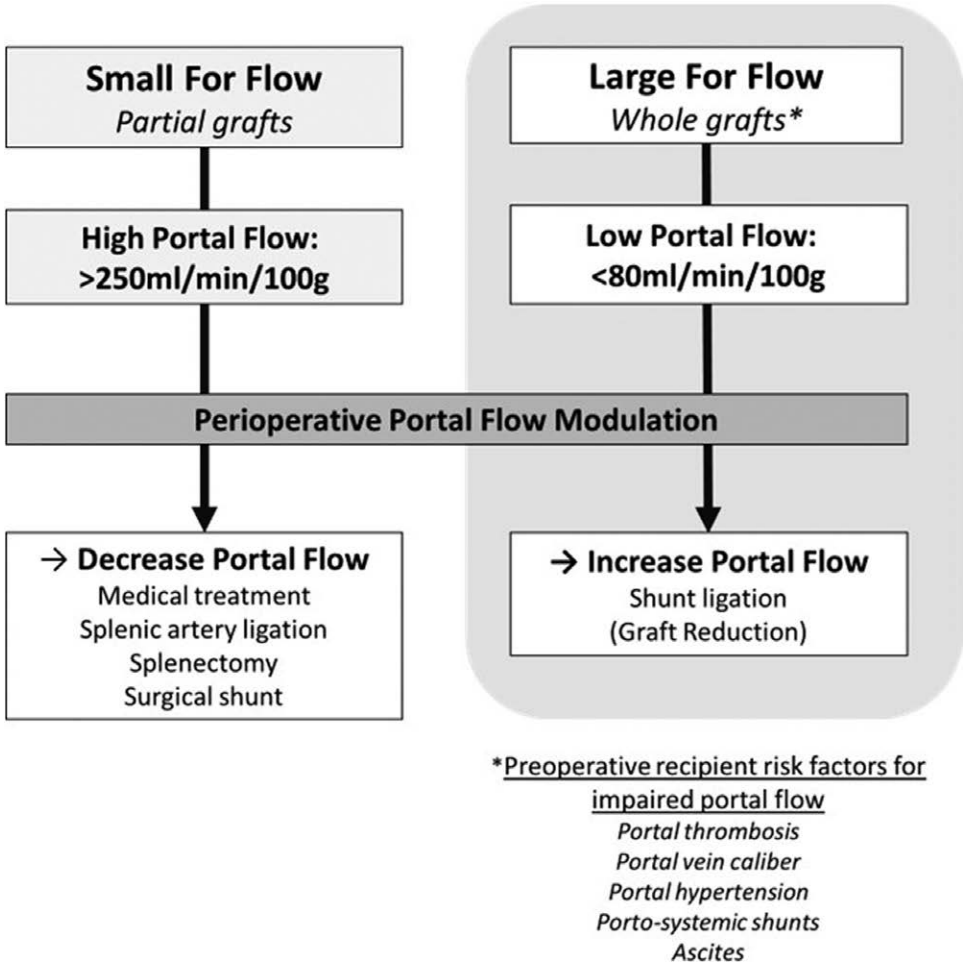

FIGURE 1. Decision algorithm for hemodynamic graft-recipient matching in liver transplantation (adapted from Rossignol et al[2]).