Pre-liver Transplant (LT) Cardiovascular Assessment Protocol at VGH

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* Preamble:
	+ Current pre-liver transplant cardiovascular assessment practice at VGH may not capture all transplant candidates with increased risk of cardiovascular disease.
	+ A more robust risk factor-based approach is warranted to adequately screen for burden of ischemic heart disease (IHD), specifically.
	+ To date, persantine MIBI has been the non-invasive test of choice in those candidates with increased risk of IHD. Given growing evidence in literature of poor sensitivity and specificity of MIBI as a test in detecting and diagnosing potentially significant IHD, we advocate for CT Coronary Angiography (CTCA) with Coronary Artery Calcium Scoring (CACS) as the primary non-invasive investigation over MIBI.

< Proposed Preoperative Evaluation >

* All patients
	+ Resting 12-lead ECG
	+ Resting TTE
	+ BNP
		- At time of referral
		- Immediately before transplant
* Patients with increased risk of CAD / IHD
	+ Risk factor based stratification
	+ ***Any*** one of the following risk factors will trigger additional investigation (below)
		- Age ≥ 60 years
		- T2DM ≥ 5 years
		- Personal history of CAD
		- NASH cirrhosis
		- Family history of premature CAD
			* Male < 55 years
			* Female < 65 years
		- History of smoking
			* Any current smoking
			* Past smoking with ≥ 20 pack-year history and < 10 years post-cessation
* Additional cardiovascular investigation
	+ CT Coronary Angiography (CTCA) with Coronary Artery Calcium Scoring (CACS)
		- If ***any*** one of the risk factors present AND ***all*** of the following criteria are met
			* Age < 75
			* eGFR > 45
			* Resting HR < 80
			* Adequate access to CTCA / CACS available\*
	+ Persantine MIBI
		- If ***any*** one of the risk factors present AND not meeting criteria for CTCA / CACS
	+ Cardiology referral for coronary angiography
		- 3 or more risk factors present
		- Current symptomatic CAD
		- Abnormal CTCA / CACS
			* ≥ 50% stenosis in any major coronary artery
		- Abnormal MIBI
	+ Coronary angiograpy
		- Consider FFR for any obstructive lesion ≥ 50% stenosis on angiography
		- Consider preference for BMS over DES to minimize duration of mandatory DAPT

< Postoperative Monitoring >

* 12 lead ECG with first troponin on POD#0
* Daily troponin x 4 days starting on POD#0\*\*
	+ ***Siemens High Sensitivity Troponin I*** (hs-Troponin I; new troponin assay at VGH)
	+ > 1000 ng/L => Cardiology referral
* Postop outcomes to monitor
	+ 30-day MACE (major adverse cardiovascular events)
		- Cardiovascular death
		- Nonfatal myocardial infarction
			* Including need for revascularization via PCI / CABG
		- Stroke
		- Heart failure
	+ Myocardial injury (ie. asymptomatic troponin elevation)

< Cardiology Referrals >

* Dr. Brunner will solicit interested colleagues from the cardiology department who may serve as part of a small group of consistent ‘Liver Transplant Cardiologists’. Transplant coordinators are to consult these select consultants for all cardiology consults from the transplant program. Once several names are identified, please share with the group so we can establish this as protocol. It would be ideal to have the same cardiologists follow these patients postoperatively both during their initial stay and after discharge with any cardiac complications or adverse effects.
* Patients with documented preexisting cardiac disease with an already established cardiology care in the community should be referred back to their cardiologist with specific questions or requests from the transplant program. Second opinions by ‘Liver Transplant Cardiologists’ at VGH may be pursued as needed.
* Notes
	+ *\*If the patient’s regional hospital does not offer CTCA / CACS, persantine MIBI can be performed instead, with plans to consider CTCA / CACS at VGH at a later time when patient presents for full transplant evaluation in person.*
	+ *\*\* Troponin should be done for 4 days in total starting on POD#0 as the original VISION study on MINS (myocardial injury after noncardiac surgery) studied troponin values collected on POD#1-3.*