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Prognostic value of single photon emission computed tomography among liver transplantation candidates

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Topic(s):
Single Photon Emission Computed Tomography (SPECT)

Citation:
Background: The optimal screening strategy for assessment of coronary artery disease in patients with end-stage liver disease (ESLD) is unclear. Although consensus based guidelines support noninvasive stress testing prior to orthotopic liver transplantation (OLT), no prospective studies are available to inform the clinician on perioperative risk stratification.

Methods: Prior to listing for transplantation, 403 consecutive ESLD patients were referred to a University hospital for cardiovascular (CV) risk stratification. All subjects met at least one of the following criteria: inability to perform >4 METs by history (62%), insulin-treated diabetes mellitus (52%), serum creatinine >152 µmol/l (8%), history of MI, PCI or CABG (5%), stable angina (4%), cerebrovascular disease (1%), peripheral vascular disease (1%). Subjects underwent Technetium-99m SPECT with multislice coronary artery calcium scoring using exercise treadmill or standard adenosine stress in those unable to achieve 85% maximal heart rate. Abnormal perfusion was defined as a sum of stress score (SSS) = 4.

Results: Of the 403 patients, 158 (age 59 ± 9 yr; male 68%) subsequently underwent transplantation and were included in the analysis. Of those, 50 (32%) died after a median duration follow up of 3.5 yr (maximal 10.8 yr). Most deaths (88%) were attributed to non-cardiovascular causes (sepsis, renal failure, malignancy). Of the 32 subjects with abnormal perfusion (20%), 11 (7%) had a high-risk perfusion abnormality – five with a total perfusion defect size (PDS) =15% and six an ischemic PDS =10%. Kaplan-Meier survival curves demonstrated abnormal perfusion was associated with increased CV mortality (two-sided log-rank tests, P = 0.014) but not all-cause death. Subjects with both abnormal perfusion and an inability to exercise >4 METs had the highest cumulative all-cause mortality (P = 0.038). Abnormal perfusion was a strong independent predictor of CV death (adjusted HR, 9.3; 95% CI, 1.6 - 54.2; P = 0.013) and MACE (adjusted HR, 7.7; 95% CI, 1.4 - 42.4; P = 0.018) in a multivariate Cox regression model that included age, sex, diabetes, smoking, creatinine >152 µmol/l and the ability to exercise >4 METs. There was no association between Agatston score and the extent of perfusion abnormality (SSS), nor with outcomes.

Conclusion: The majority of deaths following OLT are non-cardiovascular. Nonetheless, abnormal perfusion is prevalent in this high-risk population and a stronger predictor of cardiovascular morbidity and mortality than functional status. A combined assessment of functional status and myocardial perfusion identifies those at highest-risk of all-cause death.
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All-cause death

P = 0.038

Abnormal perfusion and < 4 METs (n=17) — All others (n=140)

Cumulative survival

Time (years)