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LETTER TO THE EDITORS

Toward a novel evidence-based definition of early allograft failure in the perspective of liver retransplant

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Dear Editors,

We read with interest the study of Van den Eynde *et al.* on the effect of perfusion solutions on liver transplant outcome [1]. Graft dysfunction was analysed applying two indicators: Early Allograft Dysfunction (EAD, a dichotomous system based on transaminase, bilirubin and coagulation cut-off values) [2] and Model of Early Allograft Function (MEAF, a continuous score based on the same variables as EAD) [3]. The results showed the increased vulnerability of Histidine-Tryptophan-Ketoglutarate (HTK) preserved grafts compared to University of Wisconsin (UW) and Institute George Lopez-1 (IGL-1) ones, through the higher incidence of EAD and poorer MEAF values on the unweighted analysis (HTK > UW and IGL-1).

The debate around the definition of graft dysfunction is ongoing [4–8]. New scores emerged, fine-tuning the ability to predict organ failure when recipients' condition still allows successful retransplant [3,9]. The most utilized definition of graft dysfunction remains EAD [2], although this often encompasses conditions of reversible dysfunction.

Recently, a more accurate clinical entity, namely Early Allograft Failure (EAF), allowed a precise quantification of the overall risk of failure at 90 days, thus prompting retransplant for recipients with an unsustainable risk [9]. We developed a score named Early Allograft Failure Simplified Estimation (EASE) to predict EAF and validated it in a large external cohort [10]. Our objectives were (i) to include donor and recipient factors potentially associated with the outcome, (ii) to obtain the highest C-statistic at 30 and 90 days and (iii) to be easy to use.

The components of the EASE score are MELD, number of blood transfusions, presence of postoperative thrombosis of some hepatic vessel, trends of AST, bilirubin, platelet count and centre volume (Table S1). The stratification of grafts into five classes allows characterization of the EAF-risk (which partially overlaps with the EAD-risk), achieving a C-statistic of 0.93 (95% CI 0.89–0.97) and 0.87 (95% CI = 0.83–0.91) at 30 and 90 days, respectively. The EASE score presents several pros concerning the MEAF score used by the Authors [1]. Firstly, the inclusion of kinetics of platelets captures the capability to recover from the endothelial damage due to the ischaemia/reperfusion. Secondly, the inclusion of MELD and blood transfusions reflects the severity of the disease and the recipient's surgical complexity. Furthermore, the addition of postoperative thrombosis includes a major cause of graft failure [11]. Finally, the adjustment for centre volume improves the discrimination ability. The limitation is its complexity.

Differently from what has been done with previous complex models [3,9] to compute our score, we have now developed a web-based calculator and a smartphone APP (Fig. 1).

Results of the EASE score study allowed a comprehensive definition of EAF based on those components linked to microvascular (ischaemia-reperfusion) and macrovascular (thrombosis) injury. Donor factors, recipient conditions and technical complications [11] play a role in how the recipient can sustain graft injury, and they all share the same treatment (retransplant).

The EASE score allows the prediction and mitigation of the overall postoperative risk. It could be tested in

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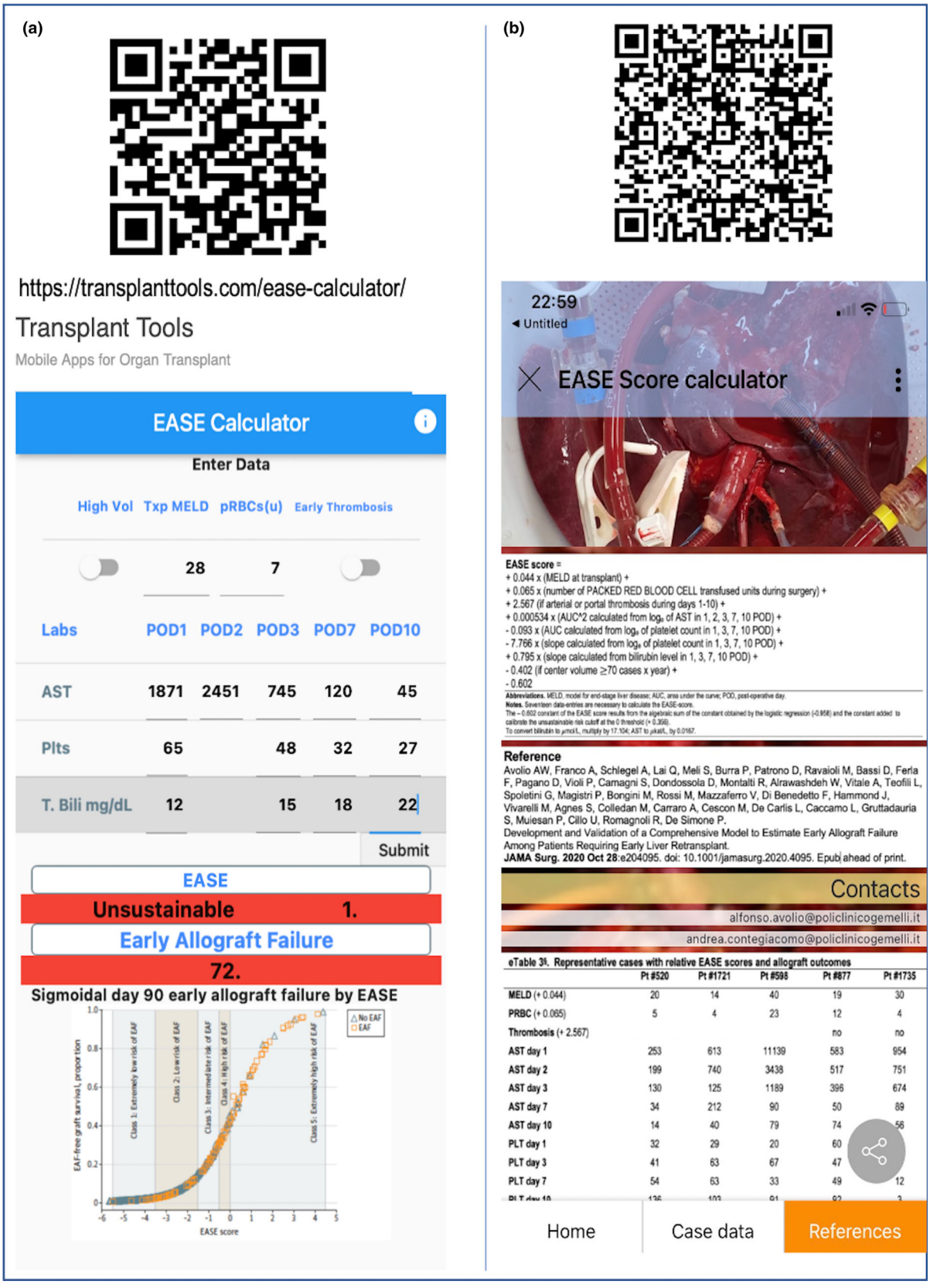

Figure 1 Tools to easily calculate the EASE score. (a) QR code and a screenshot of the EASE score calculator available online (www.transplanttools.com) and also working on smartphones. (b) QR code and screenshot of the EASE score APP installable on smartphones.

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the Authors' cohort [1] and in future research as an outcome measure of different perfusion solutions in the perspective of retransplant.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. EASE score formula.

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