



More Studies are Needed Evaluating the Diagnostic Accuracy of Magnetic Resonance Elastography for Allograft Renal Transplant Rejection

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Dear Editor,

We read with interest the recently published genitourinary review by Yu et al. (1) entitled "Multiparametric Functional Magnetic Resonance Imaging for Evaluating Renal Allograft Injury." The authors conducted a comprehensive evaluation of the literature on functional magnetic resonance imaging of renal allografts. As the authors note, while rare, complications such as hemorrhage, graft loss, and bowel-perforation related peritonitis can occur with invasive transplant biopsies (2, 3). We agree that non-invasive imaging using functional magnetic resonance imaging is a promising alternative.

In particular, we were interested to see the authors' mixed findings regarding the potential utility of magnetic resonance elastography (MRE). The authors note that MRE

may not be applicable for transplant rejection as decreased perfusion in the setting of worsening transplant function can actually decrease transplant stiffness. We have found similar results in patients with hepatic cirrhosis who have developed hepatorenal syndrome and altered liver perfusion (4).

We have a particular interest in MRE and are using the modality increasingly at our institution (5). We were considering using MRE for renal allograft transplant rejections prior to the review. To further investigate the available literature evaluating the accuracy of MRE in evaluating for allograft renal transplant rejection, we attempted a systematic review and meta-analysis (PROSPERO Registration ID: 156666). All relevant articles up to October 2019 in MEDLINE, EMBASE, Scopus, the Cochrane Library, and the grey literature were evaluated by two independent reviewers. A total of 212 potentially relevant articles were identified after any duplicates were removed. However, after the title and abstract review, and subsequent full-text review, only four articles were deemed to meet the inclusion criteria (6-9). These studies evaluated an aggregate of only 70 patients in total. Further, each study was methodologically flawed and inconsistent. A meaningful review could not be performed based on the available data.

Our findings highlight the need for future research, specifically evaluating the diagnostic accuracy of MRE for detecting allograft renal transplant rejection. A pathology reference standard such as biopsy or surgery should be used in these study designs. Until future studies demonstrate accuracy for detecting transplant rejection in a larger number of patients, the application of MRE for this purpose remains experimental.

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REFERENCES

1. Yu YM, Ni QQ, Wang ZJ, Chen ML, Zhang LJ. Multiparametric functional magnetic resonance imaging for evaluating renal allograft injury. *Korean J Radiol* 2019;20:894-908
2. Furness PN, Philpott CM, Chorbadjian MT, Nicholson ML, Bosmans JL, Corthouts BL, et al. Protocol biopsy of the

- stable renal transplant: a multicenter study of methods and complication rates. *Transplantation* 2003;76:969-973
3. Tsai SF, Chen CH, Shu KH, Cheng CH, Yu TM, Chuang YW, et al. Current safety of renal allograft biopsy with indication in adult recipients: an observational study. *Medicine (Baltimore)* 2016;95:e2816
 4. Low G, Owen NE, Joubert I, Patterson AJ, Graves MJ, Alexander GJM, et al. Magnetic resonance elastography in the detection of hepatorenal syndrome in patients with cirrhosis and ascites. *Eur Radiol* 2015;25:2851-2858
 5. Low G, Kruse SA, Lomas DJ. General review of magnetic resonance elastography. *World J Radiol* 2016;8:59-72
 6. Marticorena Garcia SR, Fischer T, Dürr M, Gültekin E, Braun J, Sack I, et al. Multifrequency magnetic resonance elastography for the assessment of renal allograft function. *Invest Radiol* 2016;51:591-595
 7. Kennedy P, Bane O, Gordic S, Hectors S, Berger M, Delaney V, et al. *MR elastography and US elastography for assessment of renal transplant fibrosis: preliminary results*. Society of Abdominal Radiology 2018 annual scientific meeting and educational course;2018 March 4-9;Scottsdale, USA
 8. Kirpalani A, Hashim E, Leung G, Kim JK, Krizova A, Jothy S, et al. Magnetic resonance elastography to assess fibrosis in kidney allografts. *Clin J Am Soc Nephrol* 2017;12:1671-1679
 9. Lee CU, Glockner JF, Glaser KJ, Yin M, Chen J, Kawashima A, et al. MR elastography in renal transplant patients and correlation with renal allograft biopsy: a feasibility study. *Acad Radiol* 2012;19:834-841