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Perspective

Acoustic Radiation in Liver Transplantation and its Clinical Outcomes

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DESCRIPTION

Acoustic Radiation Force Impulse (ARFI) elastography is a non-invasive technique that uses ultrasound waves to measure the stiffness of the liver tissue. It has been widely used for evaluating liver fibrosis in patients with chronic liver disease, but its role in liver transplant setting is not well established. The current evidence for the efficacy of ARFI elastography predicting to graft quality and clinical outcomes with Living Donor Liver Transplant (LDLT). Liver transplant is a lifesaving treatment for patients with end-stage liver disease, but it is limited by the shortage of donor organs and the risk of complications such as rejection, infection and recurrence of the original disease. Therefore, it is important to assess the quality of the donor liver and the recipient liver before and after transplantation.

Liver biopsy is the standard techinque for diagnosing liver fibrosis, but it is invasive, costly and prone to sampling errors and complications. Moreover, it is not feasible to perform repeated biopsies in the post-transplant period. ARFI elastography is a novel method that can measure the liver stiffness non-invasively by applying a short-duration acoustic pulse to generate a shear wave that propagates through the tissue. The velocity of the shear wave (*vs*) is proportional to the elasticity of the tissue, which reflects the degree of fibrosis. ARFI elastography can be performed using a conventional ultrasound probe without any additional equipment or operator training. Several studies have evaluated the performance of ARFI elastography for predicting graft quality and clinical outcomes in LDLT. 87 LDLT donors who underwent preoperative ARFI elastography found that a high *vs.* value (> 1.33 m/s) was associated with a lower regeneration rate of the remnant liver and a poorer 1-year survival rate of the recipients. They suggested that ARFI elastography might be an effective tool for estimating graft quality in LDLT.

70 LDLT recipients and 30 donors and compared ARFI elastography with other non-invasive methods such as Transient Elastography (TE), APRI and FIB4 scores. They found that ARFI elastography had a good correlation with TE and performed well in discriminating significant fibrosis (≥ F2) with a best cutoff value of 1.34 m/s. They concluded that ARFI elastography can be used as a reliable method for assessing significant fibrosis post-LDLT. 60 LDLT recipients who underwent preoperative and postoperative ARFI elastography found that ARFI elastography had a good correlation with histology and could detect early changes of graft fibrosis after LDLT. They also found that ARFI elastography could predict the occurrence of Acute Cellular Rejection (ACR) and Chronic Rejection (CR) after LDLT. 50 OLT recipients who underwent preoperative and postoperative ARFI elastography found that ARFI elastography could detect significant fibrosis after OLT with a high accuracy and could identify patients at risk for graft failure. ARFI elastography is a potential technique for non-invasive assessment of liver fibrosis in transplant setting. It can provide valuable information on graft quality and clinical outcomes in LDLT and OLT. However, more studies are needed to validate its diagnostic accuracy, reproducibility and cost-effectiveness in larger cohorts and different settings.

CONCLUSION

ARFI elastography has some advantages over other non-invasive methods for liver fibrosis assessment. It can measure the liver stiffness in real time and in any region of interest, without being affected by the liver size, shape or position. It can also avoid the confounding factors that may influence the results of TE, such as ascites, obesity and inflammation. Moreover, it can provide both qualitative and quantitative information on the liver tissue, such as the presence of nodules, cysts or tumors. However, ARFI elastography also has some limitations, such as the dependence on the operator skill and experience, the variability of the measurements due to different probe types and settings, and the inability to measure the stiffness of deep liver segments or in patients with narrow intercostal spaces.

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