Should uninfected patients accept hepatitis C-infected livers to reduce waiting time?

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A modeling study by Massachusetts General Hospital (MGH) investigators finds that the availability of directly-acting antiviral (DAA) drugs to treat hepatitis C virus (HCV) infection could allow the transplantation of livers from HCV-positive donors into HCV-negative recipients without posing undue risk. The team's report will appear in the journal *Hepatology* and has been released online.

"The availability of donor livers continues to be the limiting factor in increasing the number of liver transplant surgeries," says Jagpreet Chhatwal, PhD, of the MGH Institute for Technology Assessment, lead and corresponding author of the report. "Our study shows that transplanting HCV-positive livers into HCV-negative patients and treating with new antivirals can reduce waiting time to transplant and improve overall life expectancy."

It is not uncommon for HCV-positive organs to be discarded and not utilized for transplant because of the risks associated with HCV infection after transplantation. The recent availability of DAA drugs to treat HCV-positive recipients has led to post-transplant cure rates greater than 90 percent, significantly improving overall transplant success. DAA drugs have also reduced the number of HCV-infected patients who progress to the point of requiring a transplant, increasing the proportion of patients needing a transplant for reasons other than HCV infection. At the same time, the persistent opioid epidemic has led to a greater number of potential donors infected with HCV, who are often young and otherwise healthy. All of these factors have led to increased interest in

exploring the possibility of utilizing HCV-positive livers in HCV-negative patients on the transplant waiting list.

Since a randomized clinical trial of the use of HCV-infected donor livers in HCV-negative recipients would need to be large and conducted over several years, the MGH team decided to conduct a virtual trial by simulating the life courses of HCV-negative patients on the waiting list, and comparing probable outcomes under two scenarios - waiting for an HCV-negative liver or being open to accepting any appropriate liver, with the initiation of antiviral treatment if an HCV-positive liver was used. Based on the profiles of multiple patients on the liver transplant waiting list, the model included factors such as each patient's probable waiting time, based on disease severity and geographic region; the supply of donor livers in each region, the risk of complications from an HCV-positive liver, and the efficacy of post-transplant antiviral treatment.

Their analysis revealed that the benefit of accepting an HCV-positive liver outweighs the risks in the majority of patients on the transplant waiting list. The magnitude of the benefits depended on the severity of a patient's liver disease, which is measured by what is called a MELD score. Determined by a number of laboratory values, the MELD score ranges from 6 to 40, with a higher score indicating more severe illness. Patients can be referred for transplant evaluation with a score as low as 12, but the average MELD score for undergoing transplant is 28.

The MGH team found that HCV-negative patients with MELD scores of 20 or higher could benefit from receiving an HCV-positive liver, followed by antiviral treatment. The benefits were greatest for patients with scores of 28 and in regions hard hit by the opioid epidemic, such as the Northeast, that have greater numbers of HCV-positive donors.

"Prior to the availability of DAA drugs, the risks of transplanting HCV-positive livers into HCV-uninfected recipients were felt to be

prohibitively high and not justifiable," says Raymond Chung, MD, director of Hepatology, medical director of the MGH Liver Transplant Program and a co-author of the paper. "Every patient has extensive discussions with their care providers during the transplant listing process, part of which includes discussing the potential of accepting a 'high-risk' donor organ, such as one that tests positive for HCV. More clinical studies evaluating the use of HCV-positive donor livers and the efficacy and optimal treatment duration for antiviral drugs will be needed before this approach can be widely applied."

Co-lead author Sumeyye Samur, PhD, of the MGH Institute for Technology Assessment says, "By simulating a virtual trial, we could assess the benefits and risks of transplanting HCV-positive organs into HCV-negative patients without putting patients at risk. Our study can thus inform efficient design of future trials and clinical practice in liver transplantation."

Co-author Emily Bethea, MD, of MGH Gastroenterology and the Institute for Technology Assessment adds, "DAA treatment is expensive and is only covered by insurers for patients with documented HCV infection. If we hope to expand future coverage to HCV-negative patients on the transplant waiting list, we will need data on the cost-effectiveness of preemptive antiviral therapy to help payers recognize the importance and long-term success of this approach."

Chhatwal stresses that, while the opioid epidemic has led to the increased availability of HCV-positive organs of all types, the trend should not be seen as beneficial. "The opioid epidemic is a major health crisis affecting communities across the country, and we want to reiterate our support for efforts to address the growing epidemic."

More information: Jagpreet Chhatwal et al, Transplanting HCV-positive livers into HCV-negative patients with preemptive antiviral

treatment: A modeling study, *Hepatology* (2017). DOI: 10.1002/hep.29723