Antioxidant Improves Donated Liver Survival Rate To More Than 90 Percent

Researchers from Italy have found that the antioxidant, N-acetylcysteine (NAC), when injected prior to harvesting of the liver, significantly improves graft survival following transplantation. Results published in the February issue of Liver Transplantation, a journal of the American Association for the Study of Liver Diseases (AASLD), suggest that the NAC effect on early graft function and survival is higher when suboptimal organs are used.

A 2010 World Health Organization (WHO) report estimates that 22,000 liver transplants were performed worldwide, with nearly 18,500 from deceased donors. According to the Organ Procurement and Transplantation Network (OPTN) close to 16,000 U.S. patients are currently on the waiting list for a liver. Nearly 18,500 deceased donor transplants were performed between January and October 2012 in the U.S. OPTN reports that roughly 7,000 livers were recovered from deceased donors during the same time period.

"Liver transplantation is the standard treatment for end-stage liver disease," explains lead author Dr. Francesco D'Amico from Padova University in Italy. "Antioxidants such as NAC could potentially reduce damage to deceased donor livers, improving graft function." Studies have shown that ischemia-reperfusion injury (IFI)—damage to the liver tissue when blood supply returns to the liver after lack of oxygen (ischemia)—often occurs during storage and preservation of donated livers, and impacts early graft function post-transplantation.

For the present study researchers assigned 140 organs to adult candidates with liver disease undergoing their first transplant. An NAC infusion of 30 mg/kg was administered to one hour prior to liver procurement and another infusion of 300 mg (150mg/kg liver weight) through the portal vein before cross-clamping. There were 69 transplant candidates who received an NAC infused organ and 71 patients who had a standard transplant without NAC.

Results indicate that graft survival rates at 3 and 12 months were 93% and 90%, respectively, for patients receiving NAC infused livers; rates were 82% and 70% in the control group. Post-transplant complication rates were 23% for the NAC group and 51% in the control group. Analysis of the 61 patients receiving suboptimal livers the incidence of organ dysfunction was lower in the NAC group compared to controls at 15% and 32%, respectively.

Dr. D'Amico concludes, "Our study was the first randomized trial to investigate the use of NAC antioxidant infusion during the liver procurement procedure. We propose that NAC be used during organ harvesting to improve liver transplantation outcomes, particularly with the increased use of suboptimal organs. NAC has a good safety profile and the very low cost per patient, make this protocol highly cost-

effective in consideration of grafts survival, length of hospital stays and post operative complications. Moreover we are performing further analyses to determine beneficial effects on the other organ procured with NAC protocol."

In a related editorial published this month in Liver Transplantation the authors from the University of California, San Francisco (UCSF) and OneLegacy (Organ Procurement Organization, Los Angeles) highlight the importance and rarity of deceased organ donor research, such as the study by D'Amico et al., despite the fact that randomized clinical trials are essential to evidence-based medicine. Dr. Claus Niemann from the Department of Anesthesia and the Department of Surgery, Division of Transplantation at UCSF said, "Well-controlled deceased donor research is crucial to uncovering superior clinical practices that improve organ utilization and transplant outcomes. However, researchers are currently operating in a regulatory and legal vacuum since no review and oversight policies are established."

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