Blood condition is highly predictive of graft failure in pediatric kidney transplant

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For children receiving kidney transplants, a potentially correctable blood condition present in about one in four recipients is associated with a moderately increased risk of the graft's later failure, suggesting that clinicians should weigh whether transplant is advisable when the condition is present, according to UC Davis research presented today at the 24th International Congress of the Transplantation Society in Berlin.

Children with chronic kidney disease often have the condition, called low serum albumin, as a result of inflammation or malnutrition, among other causes. The research found that low serum albumin is an independent risk factor for higher rates of morbidity and mortality among pediatric kidney transplant recipients.

Roughly one in 65,000 children develop end-stage renal disease each year, and kidney transplant is the primary method for treating the condition in the pediatric population. The research was conducted by Lavjay Butani, professor and chief of the Division of Pediatric Nephrology, and Daniel Tancredi, a biostatistician and assistant professor in the UC Davis School of Medicine.

"Even a single low serum albumin measurement at the time of listing the patient on a transplant registry is clearly a risk factor for graft failure in the future," Butani said. "Transplant centers should very carefully consider proceeding with the transplant in children with very low serum albumin, because of its association with a moderately higher risk of graft failure."

"The transplant team, including the family and the patient, should be very cautious," he added.

During the past 30 years, the numbers of children and adolescents with end-stage renal disease has grown dramatically, according to the U.S. Centers for Disease Control and Prevention (CDC). In 1980 there were 738 persons with kidney failure under 20 years old in the United States. In 2008, the number had grown to 7,216, a 1,000 percent increase, CDC data shows.

Butani said that prolonging graft survival is key, since longer graft survival translates into fewer patients needing re-transplants. This is a benefit that is underappreciated among non-transplant providers, and is paramount in helping reduce the ever-growing disparity between patients on the wait list and those receiving transplants, he said.

Serum albumin is the most abundant protein in blood plasma and important for growth, wound healing and adequate circulation. When albumin levels are low, clinicians are divided about whether the transplant should be delayed until albumin levels can be increased.

Earlier studies in pediatric patients suggest that the longer a patient is on dialysis prior to the transplant, the poorer the long-term survival of the kidney that is eventually transplanted. On the other hand, low serum albumin levels at the time of transplant could lead to a higher risk of post-operative complications.

To assess whether post-transplant outcomes are worse in patients with lower pre-transplant albumin levels, the UC Davis researchers reviewed the records of approximately 6,000 children in the United States who received their first kidney transplant through the Organ Procurement and Transplantation Network between January 2000 and December 2010. The study examined a variety of factors, including recipient and donor

demographics and pre-operative serum albumin at the time of registration.

The transplant recipients were an average of 10.9 years old at the time of transplant; approximately 48 percent received living donor transplants. Fifty-three percent were Caucasian, 23 percent were Hispanic and 19 percent were African American. Approximately 5 percent had very low serum albumin levels (less than 2.5 grams per deciliter) and their risk of graft failure within one year was 8.3 percent, almost double the risk observed in the children with the highest serum albumin levels. The approximately 20 percent of children with intermediate serum albumin levels (between 2.5 and 3.5 grams per deciliter) had an observed one-year graft failure risk of 6.2 percent.

The study found that serum albumin levels were inversely associated with time-to-graft failure. In other words, each gram-per-deciliter increase in serum albumin was associated with a 20 percent reduction in the hazard of graft failure over an average follow-up time of four years, after accounting for other factors.

The dilemma that these results raise is whether the low albumin levels actually are a cause of poorer graft survival, or simply a reflection of something else going on in the patient's body.

"Until then, for a child with chronic kidney disease who has a low serum albumin level, the presence of a modestly elevated potential risk of graft failure is something that will need to be discussed with the patient, the family and the entire transplant team," Butani said.

The research also identified marked regional variations in the prevalence of very low serum albumin levels among children who received transplants at the time of registration. The prevalence of very low serum albumin levels prior to the transplant was more than twice as high in the

southeastern United States than in the west or southwest, a reflection of different practice patterns within the U.S. transplant community and one that merits further investigation.

"Although our study can assess whether an association exists, further research is necessary to determine if there is a cause-effect relationship," Tancredi said.

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