Blood Transfusion in Patients with CKD and Heart Failure

Patients with chronic kidney disease (CKD) often suffer from associated anaemia as the kidneys are no longer producing sufficient erythropoietin. Therapy can no longer be considered today without erythropoiesis-stimulating compounds which, however, require a relatively long period of time to take effect. In contrast, transfusions of erythrocyte concentrates (red blood cells / RBCs) are a rapid, effective method for the symptomatic treatment of anaemia.

Another comorbidity in CKD patients is heart failure. Conversely, a high percentage of patients with heart failure suffer from a chronic impairment of renal function. It is not only the widespread diseases of hypertension and diabetes, as well as smoking, that cause damage to both organs; impaired renal function and chronic heart failure exhibit direct mutual negative interactions, which are appositely described by the term “cardiorenal syndrome”. When the function of one of the two organs deteriorates, the other organ is subsequently usually also adversely affected.

The interactions between the two organs are also revealed, even after successful therapy. For example, previously severe heart failure often improves after regular dialysis and it is not uncommon for GFR to increase again after successful medicinal treatment leading to cardiac recovery.

Anaemia associated with CKD makes the situation far more complicated. On the one hand, the myocardial hypoxia caused by the lack of oxygen transporters aggravates the heart failure and, on the other hand, correction of anaemia through an increase in volume and haematocrit can also put pressure on the heart. In this context, the available data on the importance of blood transfusion in anaemic patients with CKD and heart failure remains inadequate. A study carried out based on frequency of hospitalization aims to clarify whether damage caused to patients with CKD and heart failure by volume expansion due to transfusion outweighs the benefits derived from correcting the anaemia.
ABSTRACT 4083

Red Blood Cell (Rbc) Transfusion And Heart Failure (Hf) In Advanced Chronic Kidney Disease (Ckd)
Karminder Gill1, Jeffrey C Fink2, David T Gilbertson3, Keri L Monda4, Paul Muntner5, Richard A Lafayette6, Jeffrey Petersen4, Glenn M Chertow6, Brian D Bradbury4
1Ascentiant International, Carlsbad, CA; 2Department of Medicine, University of Maryland, Baltimore, MD; 3Chronic Disease Research Group, Minneapolis Medical Research Foundation, Minneapolis, MN; 4Center for Observational Research, Amgen, Inc., Thousand Oaks, CA; 5Department of Epidemiology, University of Alabama, Birmingham, Birmingham, AL; 6Division of Nephrology, Stanford University School of Medicine, Palo Alto, CA

INTRODUCTION AND AIMS: In recent years, the use of RBC transfusion for the treatment of CKD-related anemia has increased. However, there is little information on the potential effect of transfusion on the incidence of hospitalization for HF, even though the expanded extracellular volume resulting from the transfusion is a well-known challenge for patients with advanced CKD. We sought to evaluate the burden of HF in patients with advanced CKD and to estimate the association between exposure to an RBC transfusion and the risk of HF.

METHODS: Persons 18-64 years of age with diagnosed stage 4 or 5 CKD (not requiring dialysis) between 2006 and 2010 were followed until their first hospitalization or emergency room visit with a diagnosis of HF, termination of enrollment, or death, using the OptumInsight medical claims database. We estimated incidence rates (IRs) and 95% confidence intervals (CIs) of hospitalization for HF using Poisson regression. Using a case-only design, we then matched to each HF case multiple (1:m) self-control periods with no HF (akin to traditional control sampling), and assessed use of transfusion in the 3 days immediately preceding the HF or control date. Conditional logistic regression with adjustment for time-varying confounders (acute kidney injury, hospitalization, anemia, and GI bleeding) was used to estimate rate ratios (RRs) and 95% CIs for the association between transfusion and risk of HF.

RESULTS: Of 599,535 patients with CKD, 7,829 individuals with stage 4 or 5 CKD met our inclusion criteria; 68% were age 50 or older; 43% were female; 51% had diabetes. During follow-up (median=271 days), 1,381 patients were hospitalized with a diagnosis of HF (IR: 16.3 per 100 PYs [95% CI: 15.5-17.2]). Incidence rates were higher in older patients (20.8 per 100 PYs), in males (17.4 per 100 PYs), and in patients with co-morbidities (arteriosclerotic heart disease [43.0 per 100 PYs], peripheral vascular disease [38.8 per 100 PYs] and diabetes [25.3 per 100
PYs]). There were 1,082 cases with at least one week of follow-up and, for these cases, 39,029 control periods were included in the analysis; 0.7% of cases and 0.1% of control periods were exposed to transfusion. This corresponded to a crude RR of 13.4 (95% CI: 5.4-33.2); controlling for confounding attenuated the effect, although it remained elevated (RR=3.8 [95% CI: 1.4-10.3]).

CONCLUSIONS: Hospitalization for HF is common in patients with advanced CKD and these data suggest that use of transfusion may contribute to this. These data provide additional information regarding potential adverse effects of transfusion in patients with advanced CKD and may aid in medical decision-making.