

The Cardio Renal Anemia Syndrome

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The Cardio Renal Anemia Syndrome (1) is a vicious circle involving three conditions which interact to cause anemia and to destroy the heart and the kidneys. The three factors are: Congestive Heart Failure (CHF) Chronic Renal Failure (CRF) and anemia.

Anemia can cause CHF and CRF

CHF can cause anemia and CRF

CRF can cause anemia and CHF

Thus, if we can treat the CHF and anemia early and aggressively we can prevent the progression of both the CHF and the CRF. If we do not treat the CHF adequately the reduced blood flow to the kidneys which it causes will cause progressive renal failure (1-3) which will further worsen the CHF through salt and water retention and plasma volume expansion and through reduced Erythropoietin (EPO) production causing anemia. About half of the patients with CHF have anemia (Hb <12g%) (2,4,5). The anemia will further damage the heart through increased work (ischemia, tachycardia, increased stroke volume and increased salt and water retention and increased plasma volume) (6). Eventually this all leads to Left Ventricular Hypertrophy and the hypertrophied myocardial cells eventually die from necrosis and apoptosis leading to further CHF which further worsens the CRF and the anemia etc -a vicious circle. In addition we now realize that CHF alone, even without CRF, can cause anemia. This anemia is probably due mainly to the high levels of Tumor Necrosis Factor alpha produced by the failing heart which not only damage the heart and kidneys further but reduce EPO production, interfere with the bone marrow response to EPO, and do not allow iron stored in the Reticulo-Endothelial cells to be released into the blood to get to the bone marrow to produce Hb (7,8). The anemia may also be due to the associated CRF, the use of aspirin, hemodilution, malnutrition, loss of EPO and iron in the urine with excessive proteinuria and perhaps to diabetes itself which may depress EPO production (1). That anemia is crucial in patients with CHF has now been verified by many studies that have shown that the worse the anemia:

- a) the more severe the CHF and the more it is resistant to standard CHF treatment-with more fatigue and shortness of breath and fluid retention (1,2,9,10)
- b) the greater the number of hospitalizations and rehospitalizations for CHF (1, 2, 10, 12)
- c) the higher the mortality (4, 9, 11)
- d) the faster the deterioration of CRF in CHF (1, 2, 3, 10, 12)
- e) the worse the nutritional status in CHF (9)
- f) the worse the quality of life (13)

On the other hand treating the anemia in patients with CHF with EPO (and with IV iron sucrose supplementation in some cases) has been shown to improve the New York Heart Association functional status, improve the Left Ventricular Ejection Fraction, markedly reduce hospitalization, markedly reduce the need for high dose IV and oral Furosemide, prevent the deterioration of renal function (1,2,10,12), and improve oxygen utilization during maximal exercise, exercise capacity and the quality of life (13). Whereas the one year mortality in these high risk CHF-CRF anemic patients is usually around 40%, with active treatment of the CHF and the anemia it has fallen to about 10% (12).

Adequate treatment of CHF must also involve the routine use of the beta blockers carvedilol, metoprolol or bisoprolol in combination with either an ACE inhibitor or -if this is not tolerated- an Angiotensin Receptor Blocker (ARB).

The role of anemia and its active correction is well known to the nephrologists but is not even mentioned in two recent guidelines for treatment of CHF by US cardiologists. Thus many patients with progressive CHF, CRF and anemia are only referred to a nephrologist at the end stage of CHF-CRF and after years of anemia. It behooves us to make sure our own CHF patients receive beta blockers and ACE inhibitors or ARBS and to update cardiologists and other physicians on the importance of anemia in CHF so that this vast epidemic of progressive CHF, which is already causing 6% of the total health care costs, 20% of admissions to medical wards and contributing to 50% of progressive CRF and dialysis, can be slowed or stopped.

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