



## Aquapheresis - A New Treatment Option for Fluid Overload

Ninety percent of hospitalizations for congestive heart failure are for treatment of shortness of breath due to fluid overload. In patients with heart failure, the major treatment for salt and water overload has been the use of loop diuretics, primarily furosemide. While diuretics are often effective in the removal of excess salt and water, they might properly be regarded as "necessary toxins."

The potential shortcomings of diuretics include the following:

- Oral diuretics are often poorly absorbed in heart failure because of vascular congestion of the gut. The effective dose is often difficult to determine and outpatient titration may go on for days or weeks without success.
- Even with intravenous diuretics, determining the correct dose may be difficult; under-diuresis results in prolonged hospitalization and over-diuresis can lead to low blood pressure and worsening renal perfusion.
- Despite proper dosing, diuretics may still result in worsening renal insufficiency and other metabolic abnormalities, such as hypokalemia and metabolic alkalosis.
- Diuretics really aren't very effective. In a large registry of more than 100,000 admissions for acutely decompensated heart failure, 50% of the patients were discharged with a weight loss of **less than 5 lbs.**

## An Alternative Treatment

A new device, specifically designed for ultrafiltration by way of a peripheral vein, is now available. Ultrafiltration has been possible in the past, but only with the use of a kidney dialysis machine. This has required expensive and complicated equipment, specially trained personnel, and the potential for significant hemodynamic changes because of the large blood volume that goes through the dialysis machine.

The new device, designed specifically for simple ultrafiltration, can remove up to 500 mL of salt and water each hour. The fluid removed is isotonic with plasma. For example, if the serum sodium is 140 mEq/L, the concentration of sodium in the ultrafiltrate will be 140 mEq/L. This compares favorably to a diuretic; the sodium concentration in the urine of a patient who has received diuretics is typically between 60 and 70 mEq/L. Another electrolyte benefit: the wasting of potassium is much less. If the patient's serum potassium is 4.0 mEq/L, then the ultrafiltrate will have a potassium concentration of 4 mEq/L. A diuretic, on the other hand, will wring out approximately 40 mEq of potassium per liter. The potential for metabolic derangements with diuretics is obvious.

Ultrafiltration, or aquapheresis, is safe, predictable, and effective in patients suffering from fluid overload:

- Physicians can specify rate of fluid to be removed, resulting in a gradual reduction in intravascular volume. Therefore, there is no significant impact on blood pressure, heart rate, or the balance of electrolytes in the body
- Up to 500 mL or 1.1 lb of fluid can be safely removed per hour. The average removal rate is 250 mL or .5 lb/hr and treatment usually lasts about 24 hours. Studies have shown that the total hospital stay with aquapheresis therapy is around three to four days
- Aquapheresis complements drug-based therapies such as diuretics, inotropic drug therapies, or vasoactive drug therapies to achieve the target fluid removal goal
- Because it removes sodium and resets body fluid levels, aquapheresis may also improve the effectiveness of oral diuretics that patients take on an ongoing basis

## Evidence of Effectiveness

Recently, the UNLOAD trial was published in the *Journal of the American College of Cardiology*\*; this study compared intravenous diuretics with aquapheresis. Although the study was small - 200 patients - the results were impressive. After 48 hours, patients receiving aquapheresis had:

- 38% greater weight loss over standard care
- 28% greater net fluid loss over standard care
- Equal improvement in dyspnea score

Ninety days after hospital discharge, patients receiving aquapheresis had:

- 50% reduction in the total number of re-hospitalizations for heart failure over standard care
- 52% reduction in emergency department or clinic visits over standard care
- 63% total reduction in days re-hospitalized for heart failure over standard care

\* (2007; 49:675-683, doi:10.1016/j.jacc.2006.07.073).

## Conclusion

The physicians of Appleton Cardiology Associates have closely followed the inpatient and outpatient results of those patients who have been treated with aquapheresis. The results have been most encouraging and mirror those published in the UNLOAD trial. We believe that ultrafiltration is an attractive alternative therapy for hospitalized patients with heart failure who have not promptly responded to the use of intravenous diuretics.

**If you have a patient who would be a good candidate for aquapheresis (which is available to us through ThedaCare), please refer him or her to Appleton Cardiology Associates for a consult.**