



CARDIOLOGY:

Intractable Heart Failure: Part 3 More Treatment Options

Enforcement of sodium restriction

As in Part II, Part III of Intractable Heart Failure “Animal Matters” explores treatment strategies. As a means of decreasing preload and potentially increasing the efficacy of diuretics, sodium restricted diets have been recommended for canine CHF patients. However, evidence of the clinical efficacy of such diets is lacking. Moderate sodium restriction (16 – 20 mg/kg body weight per day) is typically adequate and may aid in the management of refractory CHF patients. While theoretically beneficial, many of these diets are unpalatable. Anorexia is a frequent problem in CHF patients and a common cause for euthanasia, thus adherence to such diets is not mandatory in the author’s practice.

Use of intensive intravenous therapies

The decision to hospitalize CHF patients and initiate more aggressive intravenous strategies depends upon the results of a thorough clinical assessment. Indications may include: severe pulmonary edema causing severe dyspnea, concurrent pulmonary edema and hypotension, concurrent pulmonary edema and significant renal insufficiency, anorexia or patients that are not drinking, patients with vomiting that are unable to take oral medications, patients with CHF that are hospitalized for other diseases or procedures. A brief summary is provided below.

Diuresis

A constant rate infusion (CRI) of intravenous furosemide can result in more natriuresis and diuresis than intermittent bolus therapy. A constant effective dose can be maintained at the site of action and the rebound sodium retention that may occur with intermittent bolus therapy is avoided. The CRI regimen may also be preferred in patients with renal insufficiency. One CRI dose is 0.5 – 1 mg/kg/hr IV, administered in crystalloid fluids at $\frac{1}{4}$ maintenance rate for a maximum of usually 8 hours. Alternatively, anticipated or current intermittent bolus doses may be totaled for 24 hours, then divided by 24 to arrive at an hourly rate. That hourly rate is administered in $\frac{1}{4}$ maintenance crystalloids for up to 8 hours. Monitoring of blood pressure, renal parameters, and electrolytes is critical as always.

Afterload reduction

Intense afterload (and preload) reduction may be achieved with an infusion of sodium nitroprusside (a nitrate), which has potent arterial and venous vasodilating properties. This is particularly useful in mitral valve disease (MVD) patients with severe pulmonary edema. A positive inotrope should be initiated first in dilated cardiomyopathy (DCM) patients. Infusion is initiated at 1 μ g/kg/min IV. Blood pressure **must** be monitored, preferably on a continuous basis via direct arterial catheterization, but potentially by indirect (Doppler or oscillometric) methods every 15 - 30 minutes. The dose is increased by 1 μ g/kg/min every 30 minutes to about 5 μ g/kg/min, **as long as blood pressure is maintained**. If hypotension is encountered, the dose must be decreased back to the previously tolerated level. As it is light sensitive, the fluid bag in which it is mixed and the fluid line must be wrapped in aluminum foil. Cyanide toxicity is a potential side effect with high doses or long-term therapy, therefore infusions are continued for no more than 72 hours.

Positive Inotropy

Dobutamine is the most commonly administered intravenous positive inotrope, and DCM is the most common disease scenario in which it is given in terms of causes of CHF. The dose is typically 5 – 10 µg/kg/min IV. Monitoring of BP and rhythm by ECG are essential. Side effects may include nausea and ventricular arrhythmias. In patients with atrial fibrillation, rate control (typically the calcium channel blocker diltiazem) **must** be initiated beforehand as dobutamine can cause life-threatening acceleration of heart rate.

Additional afterload reduction

In patients with acceptable blood pressure (systolic BP > 90 mmHg), afterload reduction with additional arterial vasodilators may be effective in increasing forward flow, reducing regurgitant flow, and decreasing wall stress, ultimately resulting in decreased pulmonary edema. ACE-inhibitors and pimobendan both have arterial vasodilating properties, the latter likely more potent than the former. Amlodipine is a dihydropyridine calcium channel blocker with action primarily on vascular smooth muscle. It has a long half-life (30 hours) and thus a slow onset of action. It is initiated at 0.05-0.1 mg/kg once daily PO, and may be up-titrated to 0.2 mg/kg once daily as long as blood pressure is monitored (after 5-7 days) and remains > 90 mmHg systolic. Hydralazine is another potent vasodilator with an unknown mechanism of action and much more rapid onset of action. It is initiated at 0.5 mg/kg BID PO and may be up-titrated to 1.5 mg/kg BID with careful and more frequent monitoring of BP. Frequent side effects include hypotension, tachycardia, and gastrointestinal signs. Periodic monitoring of renal function is necessary with either vasodilator.

Referral to a cardiologist

Where available, this option should always be considered and offered to clients. The risks and complications encountered in refractory CHF patients are great, and rather than initiating therapy that is outside the level of comfort of the practitioner or that cannot be monitored appropriately, referral may be in the best interest of the patient and client.

Questions?

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Call our Cardiology service to find out more about this or other cardiology questions. Our boarded cardiologists are available at our Southfield hospital by appointment. Cardiology cases can be seen 24/7 by our highly trained emergency doctors and technicians who consult with our cardiologists when necessary.

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