Systolic Dysfunction

Clinical Features

History of hypertension, myocardial infarction, diabetes mellitus, valvular insufficiency
Presents with progressive dyspnea
Physical exam reveals S3 gallop, and displaced PMI
Chest x-ray reveals congestion and cardiomegaly
Ejection fraction <35-40%.

Medical Management

Medications
Strict control of hypertension
Diet
Activity
Immunizations
Revascularization
Transplantation

Medications

Angiotensin-converting enzyme (ACE) inhibitor is first line therapy unless contraindication (history of intolerance or sensitivity, serum K+ >5.5, or symptomatic hypotension) start with low dose and increase to maximum tolerated dose; use caution if creatinine > 2.0.
Angiotensin receptor blocker (ARB) may be considered in place of ACE inhibitors if intolerant of same.
Diuretic may be begun concomitantly with ACE inhibitor if overt signs of fluid overload, or added to ACE inhibitor if symptoms persist after optimal dose level of ACE inhibitor is attained.
Digoxin may be added if patient remains symptomatic after optimal treatment with ACE inhibitors and diuretic, or if patient has atrial fibrillation with rapid ventricular response.
Hydralazine and isosorbide dinitrate may be substituted for those with contraindications or sensitivity to ACE inhibitors and ARB.
Beta-blockers for patients after myocardial infarction, with dilated cardiomyopathy or angina, to be instituted only in stable patients slowly and with caution, after ACE inhibitor dosage is maximized and only by those experienced in treatment of CHF since signs/symptoms may worsen prior to improvement. Should be used only in NYHA functional class II or III,* or in patients with tachyarrhythmia. Start with low dose and increase to maximum tolerated dose.
Anticoagulation should be considered for patients with atrial fibrillation, prior history of systemic or pulmonary emboli, intracardiac thrombus, or those with very low ejection fraction.

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If CAD is present, lipid-lowering agent to control LDL cholesterol to <100 must be considered.

*Definition of New York Heart Association Functional Classification for CHF*

1. Functional Class I: Ordinary physical activity does not cause undue fatigue, palpitations, or dyspnea.
2. Functional Class II: Patients are comfortable at rest. Ordinary physical activity results in symptoms.
3. Functional Class III: Patients are comfortable at rest. Less than ordinary physical activity causes symptoms.
4. Functional Class IV: Patients are unable to carry on any activity without symptoms. Symptoms may occur at rest.

**Diet - Activity - Education**

3 Gm/day Na+ diet (2 Gm preferred)
Limit alcohol to one small drink per day (8 oz. beer; 5 oz. wine, 1 oz. whiskey); no alcohol if it is the cause of cardiomyopathy.
Exercise should be mild to moderate of dynamic type (walking, cycling, swimming), 3-5x/wk, may be spaced throughout day, and should NOT be isometric or require intense exertion.
Patient should not lift more than 10-15 pounds.
Patient and family should understand importance of diet, exercise, compliance with medications, daily monitoring of weight with report to physician if weight gain over 3 pounds from dry weight.
Advance directive should be completed.

**Immunizations**

Immunization with influenza and pneumococcal vaccines may reduce the risk of a respiratory infection.

**Revascularization**

Consider workup for ischemic heart disease in all patients who are candidates for revascularization procedure, who have history of angina, infarction, ischemic changes with exercise tolerance testing, or segmental wall motion abnormalities on Echocardiogram.

**Transplantation**

Of value in selected cases; logistics limits potential to 2,500 cases per year in the U.S. One year survival rate is currently 90%.

**Patient to Monitor at Home**

Record daily weight and report to physician if weight gain is 2-3 pounds overnight or 5 pounds in one week over dry weight. Report worsening of symptoms.

**Physician Monitoring**

Frequent follow-up until stable and asymptomatic with ordinary activity.
Follow-up every one to three months, if stable, to monitor:
  - functional status
  - heart rate, blood pressure, weight, heart, lungs, edema
  - laboratory as clinically indicated; especially BUN, creatinine, electrolytes
Diastolic Dysfunction

Clinical Features

Characterized by normal EF with signs and symptoms of CHF.
History of hypertension, renal disease, diabetes mellitus, aortic stenosis.
May present with acute onset pulmonary edema.
Physical exam reveals S4 gallop and sustained impulse at PMI.
Chest x-ray reveals congestion and normal heart size.
EKG reveals left ventricular hypertrophy.
Echocardiogram reveals normal or increased ejection fraction.

Medical Management

Medications
- Strict control of hypertension
- Diet
- Activity
- Education
- Immunizations
- Revascularization
- Transplantation

Medications

Begin with ACE inhibitor and/or diuretic and/or nitrate therapy. If intolerant to ACE inhibitors, consider ARB.
Calcium channel blocker (verapamil or diltiazem) and Beta-blocker may be of benefit if patient remains symptomatic.
Inotropic agents are not indicated. If rate is >70, or control of tachyarrhythmia is needed, Beta-blocker or calcium channel blocker may be considered for first line therapy.
Anticoagulation should be considered for patients with atrial fibrillation, prior history of systemic or pulmonary emboli or intracardiac thrombus.

Diet - Activity - Education
Immunizations
Revascularization
Transplantation
Patient to Monitor at Home
Physician Monitoring

Same as with Systolic Dysfunction

Is etiology of CHF known?

Yes

Systolic Dysfunction
- Consider anticoagulation for pts with AF, history of systemic or pulmonary emboli, intracardiac thrombus, or those with very low ejection fraction
- Begin ACE inhibitor, progressing from low to maximum tolerated dose. ARB may replace ACE inhibitor if intolerant, or may use hydralazine and isosorbide dinitrate if intolerant of ACE inhibitors and ARB
- Is patient still symptomatic?
  - Yes: Add diuretic (may be begun initially with ACE inhibitors if overt signs of fluid overload)
  - No: Consider B-blocker only in NYHA functional Class II or III and only in stable patients by those experienced in treatment of CHF (may be instituted early in pts post AMI, with dilated cardiomyopathy, or with angina)
- Is patient still symptomatic?
  - Yes: Add digoxin (may be begun initially if pt has AF c RVR)
  - No: Consider spironolactone
- Monitoring program

No

Diastolic Dysfunction
- Consider anticoagulation for pts with AF, history of systemic or pulmonary emboli, or intracardiac thrombus
- Control hypertension; consider lipid-lowering agent to control LDL cholesterol to <100
- Begin with ACE inhibitor and/or diuretic and/or nitrate therapy. If intolerant to ACE inhibitors, consider ARB. If rate is >70 or control of tachyarrhythmia is needed, Beta-blocker or calcium channel blocker may be considered for 1st line therapy. Do not use digitalis derivatives for tachyarrhythmia
- Is patient still symptomatic?
  - Yes: Add Calcium channel blocker and/or B-blocker
  - No: Monitoring Program

Is patient still symptomatic?

No

Ascertain etiology; either systolic or diastolic dysfunction

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