ADVANCES IN MANAGEMENT OF HEART FAILURE

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A. General measures-
   a. Encourage regular physical activity within limits of tolerance.
      It improves functional capacity.¹
   b. Manage sleep related breathing disorders. It reduces morbidity & mortality.²
   c. Avoid NSAIDS. All NSAIDS cause dose dependent increase in risk of death and hospitalization.
   d. Correct anemia.

B. Digoxin
   a. Low dose 0.125mg daily or on alternate day is also useful due to neurohormonal and autonomic effects present at lower concentration.³
   b. Usefulness not established in asymptomatic heart failure and heart failure with normal ejection fraction.³
   c. Currently recommended as an add on agent in patients with persistent heart failure symptoms inspite of use of ACEI/ARB, beta blockers & diuretics.³ It does not improve survival.¹
   d. In atrial fibrillation beta blockers are effective in controlling ventricular rate and improve survival. Digoxin should, therefore, be considered as an adjunctive agent for rate control.³
   e. Digoxin should not be used for primary therapy of patients with acutely decompensated heart Failure.³

C. Diuretics
   a. Triamterene should not be combined with furosemide since triamterene blocks the tubular secretion of furosemide thus inhibiting furosemide effect.⁴
   b. Continuous infusion of furosemide / Torsemide produces increased diuresis in diuretic refractory patients.³
   c. Combination of metolazone and loop diuretics is the most effective approach to elicit diuresis in diuretic refractory patient.⁵
   d. Cardiorenal syndrome¹
      Coexistence of renal insufficiency and heart failure and adverse impact of one condition on the other.
      Pathophysiology
      i. Heart failure results in worsening of renal function due to-
         • Venous congestion.
• Hypoperfusion.
• Neurohormonal vasoconstrictor activation.
• Use of ACEI/ARB → decreased intraglomerular pressure.
• Use of loop diuretics → Neurohormonal vasoconstrictor activation → Tubuloglomerular feedback
  Loop diuretics → increased delivery of Na to the distal tubule → increase in adenosine release → renal afferent arteriolar vasoconstriction.
- Hypertrophy of convoluted tubules → increased absorption of Na.

ii. Effect of comorbid conditions on renal functions

Age, hypertension, Diabetes, Arteriosclerosis
Worsening of renal function results in sodium and water retention and further worsening of heart failure.

e. Diuretic resistance
  i. Drugs promoting fluid retention- thiazolidinediones
  ii. Hypoalbuminemia decreases diuretic efficiency by decreasing drug delivery to kidneys.

D. Angiotensin receptor blockers
  a. ARBs may also be considered as first line therapy instead of an ACEI.
  b. Addition of an ARB to an ACEI and beta blocker regimen may give added benefit.

E. Aldosterone antagonists
  a. Recommended in stage C and stage D heart failure patients receiving ACEI or ARB and a beta blocker.
  b. Addition in combination with an ACEI & ARB is discouraged due to magnified risk of Hyperkalemia.

F. Beta blockers
  a. Beta blockers shown to reduce mortality- Metoprolol Succinate, Carvedilol, Bisoprolol
  b. Alpha agonist and antioxidant properties of Carvedilol provide beneficial metabolic effect in diabetes as compared to Metoprolol tartrate.
  c. Patients with COPD may tolerate moderate doses of Metoprolol succinate.

G. Ivabradine

Addition of Ivabradine to Metoprolol, in comparison with up titration of Metoprolol is associated with improvement in LV systolic function.

H. Isosorbide dinitrate+hydralazine

Combination is effective in some patients. Tolerance is poor.

I. Antiarrhythmics
  a. Reserved for heart failure patients with documented hemodynamically destabilizing VT, VF or survivors of sudden cardiac death who are not candidates for ICD.
  b. Suppression of non-sustained VT or frequent ventricular ectopics in heart failure patients is not advised.
  c. In atrial fibrillation
    i. Beta blockers are preferred over Digoxin.
    ii. Dronedarone has been shown to increase mortality in heart failure patients.
    iii. Rhythm control does not reduce cardiovascular events as compared to rate control Strategy.
    iv. Pulmonary vein antrum isolation has been shown to be better than AV nodal ablation and biventricular pacing.

J. Anticoagulants

Routine use is disputed except for
  • Chronic atrial fibrillation.
  • History of systemic or pulmonary embolism.
  • Documented mobile LV thrombus.

K. Cardiac resynchronizations therapy
  a. Dyssynchrony may be interventricular (right to left ventricular delay) or intraventricular (delay between anteroseptal and posterolateral wall of LV).
  b. Mechanical dyssynchrony index as evidenced by tissue Doppler imaging is more reliable than electrical evidence of conduction delay with QRS duration of >120msec.
  c. 1/3 of patients have no significant clinical or functional improvement.
  d. A combined CRT-ICD device is considered reasonable in ambulatory NYHA class III patients.
Advances in Management of Heart Failure

There is no consensus on

i. Most relevant measures of dyssynchrony.

ii. Optimum site for biventricular pacing leads.

iii. Predictors of response.

iv. How sick heart failure patient should be to benefit from CRT.

v. How to apply biventricular pacing in the setting of atrial fibrillation.

vi. Role in heart failure patients with narrow QRS complex.

L. Implantable cardioverter defibrillator

Recommended - primary prevention if EF is <30%
- Secondary prevention in hemodynamically destabilizing VT, VF or patients with resuscitated cardiac arrest.

Identification of heart failure patients most likely to benefit from ICD is still suboptimal.

M. Enhanced external counterpulsation

Not recommended.

N. Advances in surgical treatment

a. Endoscopic coronary revascularization.

b. Mitral valve procedures - minimal invasive techniques.
- Catheter based techniques.

c. Cardiac support device - circumferential mash positioned around the ventricles to reduce End-diastolic volume without increasing end-diastolic pressure.

d. Mechanical circulatory support
- Ventricular assist devices as bridge to transplantation.
  - Centrifugal flow pumps are under evaluation
    - Smaller size & increased durability.

e. Endothelin receptor antagonist e.g. Tezosentan.

f. Relaxin
  Administered intravenous 30\mu g/Kg/day. Vasodilation by effect involving nitric oxide, endothelin, atrial natriuretic peptide and vascular endothelium growth factor.

i. Gene transfer
  Delivery of genetic material into cardiac cells to augment expression of genes that encode the proteins that play critical role in the control of cardiac myocyte structure & function. Gene transfer therapy using an adeno-associated virus vector carrying sarco-endoplasmic reticulum ATPase 2A gene is under clinical evaluation.

j. Cell transplantation therapy
  It is based on the presumption that transplanted cells could replace the diminished pool of myocytes. More research is needed regarding most ap-
appropriate cell type, optimal dose, optimal method of delivery and role of co-administration of other agents.

k. Immune based therapy

Routine use of immune based therapy in myocarditis is not recommended.

REFERENCE