INTRODUCTION

Heart failure is a complex syndrome which is due to a problem with the structure or function of the heart which impairs the ability of the heart to function as a physiological pump to meet the body’s need. Heart failure is a common disabling condition. In developing countries, around 2% of adults suffer from heart failure, but in those over the age of 65, this increases to 6—10%(1). Heart failure also causes a heavy burden on state’s economy. The health expenditure on patients with Heart Failure has been estimated to be around 2% of the total budget of the National Health Service in the United Kingdom, and more than $35 billion in the United States (1,2).

Heart failure is associated with significantly reduced physical and mental health, resulting in a markedly decreased quality of life. With the exception of heart failure caused by reversible conditions, the condition usually worsens with time. Although some patients survive many years, progressive disease is associated with an overall annual mortality rate of 10%(1).

CLASSIFICATION

There are many different ways to categorize heart failure, including:

- the side of the heart involved, (left heart failure versus right heart failure)
- whether the abnormality is due to contraction or relaxation of the heart (systolic dysfunction vs. diastolic dysfunction)
- whether the problem is primarily increased venous back pressure (behind) the heart, or failure to supply adequate arterial perfusion (in front of) the heart (backward vs. forward failure)
- whether the abnormality is due to low cardiac output with high systemic vascular resistance or high cardiac output with low
vascular resistance (low-output heart failure vs. high-output heart failure)
• the degree of functional impairment conferred by the abnormality (as in the NYHA functional classification)

CAUSES

An Italian registry of over 6200 patients with heart failure showed the following underlying causes (1)

1. Ischemic Heart Disease 40%
2. Dilated Cardiomyopathy 32%
3. Valvular Heart Disease 12%
4. Hypertension 11%
5. Other 5%

Rarer causes of heart failure include:

1. Viral Myocarditis (an infection of the heart muscle)
2. Infiltrations of the muscle such as amyloidosis
3. HIV cardiomyopathy (caused by Human Immunodeficiency Virus)
4. Connective Tissue Diseases such as Systemic lupus erythematosus
5. Abuse of drugs such as alcohol
6. Pharmaceutical drugs such as chemotherapeutic agents.
7. Arrhythmias

MANAGEMENT

There has been great advancement in the treatment of heart failure as compared to 20 years ago. However, the mortality, morbidity, and costs of caring for patients with heart failure remain substantial.

After a detailed history and examination, the patients should have initial routine investigations (Blood tests including BNP if available, ECG, CXR etc.) followed by Transthoracic Echocardiogram to confirm the diagnosis. Subsequently a diagnostic Cardiac Catheterization study needs to look for the commonest cause of Heart Failure.

Treatment focuses on improving the symptoms and preventing the progression of the disease. Reversible causes of the heart failure also need to be addressed: (e.g. infection, alcohol ingestion, anemia, thyrotoxicosis,
arrhythmia, and hypertension). Treatments include lifestyle and pharmacological modalities.

**TREATMENT MODALITIES**

*a. Diet and lifestyle measures*

Patients with CHF are educated to undertake various non-pharmacological measures to improve symptoms and prognosis. Such measures include:

- Patients should be advised to encourage doing regular aerobic exercise.
- Weight reduction – through physical activity and dietary modification, as obesity is a risk factor for heart failure and left ventricular hypertrophy.
- Sodium restriction – excessive sodium intake may precipitate or exacerbate heart failure, thus a "no added salt" diet (60–100 mmol total daily intake) is recommended for patients with CHF.
- Fluid restriction – patients with CHF have a diminished ability to excrete free water load. Generally water intake should be limited to 1.5 L daily or less in patients with hyponatremia, though fluid restriction may be beneficial regardless in symptomatic reduction.
- Patients must be strongly advised not to smoke.
- The alcohol consumption should be discussed with the patient and should be tailored appropriately to the clinical circumstances.

**PHARMACOLOGICAL MODALITIES**

Treatment of CHF aims to relieve symptoms, to maintain a euvoletic state (normal fluid level in the circulatory system), and to improve prognosis by delaying progression of heart failure and reducing cardiovascular risk. In the past few decades, many novel mechanistic targets have been proposed, and physicians now have abundance of proven therapies.

In the 1980s, the Pfeffers and many others developed the concept that the core lesion of chronic Heart Failure is progressive left ventricular remodeling. Some, but not all of these changes in LV (Left Ventricle) geometry and performance are driven by neurohormonal activation, including excessive sympathetic activity and increased activity of the renin-angiotensin-aldosterone system (RAAS). Chronic blockade of these systems with B-adrenergic blocking drugs and agents that inhibit the RAAS such as Angiotensin converting enzyme (ACE) inhibitors, Aldosterone receptor blockers, and Angiotensin receptor blockers (ARBs) reduces progressive LV
remodeling and improves patient survival. These agents, along with diuretics, constitute the core treatment for Chronic Heart Failure today.

ACE inhibitors are recommended for all patients with current or prior symptoms of heart failure and impaired systolic function unless contraindicated. ACEIs block RAAS, decrease afterload, and prevent LV remodelling. Many trials (SOLVD(6), AIRE(7), and CONSENSUS(8) have shown that ACE inhibitors reduce cardiovascular mortality, morbidity and hospitalization in patients with heart failure. The survival benefits and significant reductions in cardiovascular morbidity related to treatment with ACE inhibitors are likely achieved by titrating the dose of ACE inhibitors to the target dose achieved in clinical trials. Patients intolerant to ACE inhibitors can be switched to ARBs. The CHARM(9) (Candesartan in Heart failure: Assessment of Reduction in Mortality and morbidity)-Alternative and VALIANT(10) (VALsartan In Acute myocardial Infarction Trial) trials have shown the effectiveness of using ARBs in patients with Heart failure as an alternative to ACE inhibitors.

Beta-blockers proven to reduce mortality (CIBIS II(11), COPERNICUS(12), US carvedilol(13), MERIT HF(14) are recommended for all stable patients with current or prior symptoms of heart failure and reduced LVEF (Left Ventricle Ejection Fraction), unless contraindicated. Beta-blockers inhibit sympathetic nervous system and decrease mortality, hospitalizations, and risk of sudden death. They improve LV function, exercise tolerance, and heart failure functional class. The Beta-blockers that have shown to be clinically effective in treatment of heart failure are carvedilol, bisoprolol and metoprolol succinate. The former is a non-selective beta-blocker with additional blockade of alpha1-adrenoceptors while the latter two agents are selective B1-adrenergic blocking agents. This may indicate a class effect with the implication that all beta-blockers could provide the same effect. However, the results from the clinical trials do not support this view. The BEST(15) study evaluated the effects of Bucindolol in patients with advanced heart failure. Bucindolol is a non selective beta-blocker with vasodilator properties. The clinical trial was stopped prematurely when it became apparent the effects of bucindolol was less favourable than those of other beta-blockers. Further evidence against equal efficacy of beta-blockers is available from the COMET(16) study. This study compared carvedilol and metoprolol tartrate (the short acting preparation of metoprolol) in patients with symptomatic heart failure with left ventricular dysfunction. This study showed that carvedilol 25mg twice daily was superior to metoprolol tartrate 50 mg thrice daily. These results illustrates that not all beta-blockers are effective in reducing cardiovascular risks in heart failure patients. Bisoprolol and Carvedilol are currently licensed for treatment of heart failure in UK.

Aldosterone antagonists are weak diuretics that improve mortality and risk of sudden death by blocking aldosterone effects, therefore decreasing myocardial and vascular inflammation, collagen production, preventing
apoptosis, decreasing RAAS and sympathetic nervous system stimulation, and acting as a membrane stabilizer preventing arrhythmia. Spironolactone (RALES trial(17) is commonly used aldosterone antagonist. The major side effects are hyperkalemia and gynaecomastia. Patients intolerant to Spironolactone can be switched on to Eplerenone (EPHESUS trial(18)

Diuretic therapy improves symptoms by decreasing preload, afterload, and intracardiac filling pressures. First-line diuretic therapy is a loop diuretic (furosemide, bumetanide, torsemide) in the lowest efficient doses either once or twice a day, although it can be used up to 3-4 times a day depending on the individual response and renal function. If the patient does not respond to the above strategy, a thiazide diuretic (hydrochlorothiazide or metolazone) can be added 30 minutes prior to the loop diuretic to enhance response. Careful monitoring of renal function and potassium is necessary for all diuretics.

Digoxin also known as digitalis has antiarrythmic as well as positive ionotropic properties. Digoxin acts by inhibiting the Na⁺/K⁺-ATPase transport pump and inhibits sodium and potassium transport across cell membranes. Digoxin is recommended for patients with heart failure who continue to have symptoms despite optimal medical therapy as it showed in the DIG trial(19) to decrease hospitalization rate. Digoxin does not affect heart failure mortality. Digoxin is also an effective agent against atrial tachyarrhythmias at rest in patients with LV dysfunction, but it has limited efficacy in controlling the ventricular rate of atrial arrhythmias during exertion.

Recently, new devices such as cardiac resynchronization therapy (CRT) and implantable cardioverter-defibrillators (ICDs) have accounted for more success in improving patient survival than new drugs. (MIRACLE(20)

Despite many successful clinical trial, the annual mortality for Heart Failure remains about 8%-10% per year (down from about 20% per year 30 years ago), and there is ongoing quest to find newer, safer, and more efficacious drugs.

The current recommendations for treatment for Chronic Heart Failure from NICE are as follows:

- Diuretics should be used routinely for relief of congestive symptoms and fluid retention in patients with heart failure.
- All patients with heart failure due to left ventricular systolic dysfunction should be considered for treatment with an ACE inhibitor. Angiotensin II Receptor Blockers (ARBs) should be considered if ACE inhibitors are not tolerated or contraindicated.
- Beta blockers should be started in patients with heart failure due to left ventricular systolic dysfunction after diuretic and ACE inhibitor therapy (regardless of whether or not symptoms persist).
- Spironolactone should be added if patient remains moderately to severely symptomatic despite optimal treatment.
• Digoxin should be considered in patients with severe heart failure not responding to ACE inhibitor, beta-blocker and diuretic therapy. It is also recommended for patients with atrial fibrillation and any degree of heart failure.

• Cardiac resynchronisation therapy should be considered in selected patients with left ventricular systolic dysfunction (left ventricular ejection fraction < 35%), drug refractory symptoms, and a QRS duration > 120 ms.

The second National Heart Failure Audit between July 2007 and March 2008 collected data from 105 NHS Trusts. The hospitals submitted data on 7390 patients and of these 6299 records included clinical information about the first admission. There were 1715 readmission records for 763 patients.

ACE inhibitors prescription was noted in 5008 patients. Of these, 46.1 percent were prescribed ACE inhibitors on initial admission and 43.7 percent on readmission.

Beta blockers prescription was noted in 4965 patients. 36.4 percent of these patients were prescribed beta blockers on initial admission and it was slightly higher for readmission with 43.7 percent of patients prescribed this drug.

Information about prescribing Angiotensin II receptor antagonists was noted in 4824 patients. Of these, 9.2 percent were prescribed Angiotensin II receptor antagonists on initial admission and 10.5 percent on readmission.

Loop diuretics prescription was noted in 5287 patients. Of these, nearly three quarters of patients (73.8 percent) were prescribed Loop diuretics on initial admission, increasing to 87.2 percent on readmission.

Information about prescribing Aldosterone receptor antagonist was noted in 4837 patients. Of these, only 13.1 percent were prescribed Aldosterone receptor antagonist on initial admission, increasing to 22 percent on readmission.

The above audit report illustrates that patients with heart failure admitted to various hospitals in UK were not managed fully in accordance with evidence-based NICE guidelines. The NHS trusts in UK are falling short of adhering to the NICE guidelines for management of Chronic Heart Failure.

At present there are strong evidence based pharmacological therapy available. It is imperative that almost all patients with Chronic Heart Failure receive these treatments and are managed in accordance with NICE guidelines. It will help in reducing the morbidity and mortality of these patients and also improving their quality of life.
REFERENCES:


