Congestive heart failure: What can we offer our patients?

William J. Kostuk

See related article page 1033

Heart failure is a chronic and progressive disorder that is characterized by frequent hospital admissions and high annual mortality rates (25%–40%).[1] Both the incidence and prevalence of heart failure have increased during the past 3 decades, and they will continue to increase. This increase is related to advances in diagnostic techniques in addition to medical and surgical therapies that have improved survival rates in patients with cardiovascular disease. Our aging population contributes further to this increase. Heart failure affects more than 400 000 Canadians, with over 50 000 new cases occurring annually.[1]

In this issue (page 1033), Debbie Ehrmann Feldman and colleagues review trends in Montreal in admissions to hospital due to congestive heart failure in individuals aged 65 years or more.[2] Between 1990 and 1997, the annual rate of admissions to hospital for this disorder increased by 35%. At the same time, the readmission rate within 6 months rose to almost 50%. The one saving grace was the reduction in annual length of stay in hospital by 26% to a mean of 12.2 days. At the same time, the age-adjusted mortality rates did not change significantly. Although this review did not address the issue of treatment or changes in therapy during the time of the study, it does highlight the prevalence of this increasingly common cardiovascular disorder. With its high consumption of medical resources, heart failure is becoming the most costly cardiovascular illness. What can we offer our patients today?

The Canadian Cardiovascular Society's consensus recommendations for the management of chronic heart failure were published in 1994.[3] These are useful practice guidelines for the evaluation and treatment of patients with heart failure. These guidelines are currently being updated to incorporate changes in treatment.

The management of patients with heart failure consists of several important steps: diagnosis, identification of causes or reversible factors, and intervention. An early and complete clinical evaluation of all new patients with heart failure is essential to identify possible systemic and cardiac causes that may be reversible. The predominant cause of heart failure is ischemic heart disease; this accounts for nearly 70% of the incidence of heart failure in Canada. This is followed by idiopathic dilated cardiomyopathy, hypertension and valvular heart disease. An accurate diagnosis of the cause of heart failure is critical. Interventional therapies for specific cardiovascular disorders, such as myocardial ischemia or valvular dysfunction, are essential. Systolic dysfunction with reduction in myocardial contractility is present in the majority of patients with heart failure. This reduction in left ventricular ejection fraction can be readily determined by noninvasive assessment with either echocardiography or radionuclide angiography. Indeed, this noninvasive assessment is essential in all patients with clinical evidence of congestive heart failure both to aid in diagnosis and to monitor progress. About one-third of patients, however, may have a normal or nearly normal left ventricular ejection fraction. In these patients, heart failure is the result of diastolic dysfunction, namely, impaired left ventricular relaxation or decrease in ventricular compliance. The chief risk factors are advancing age, hypertension, diabetes, left ventricular hypertrophy and coronary artery disease.[4] However, many cases of heart failure have elements of both systolic and diastolic dysfunction.

Our goals of therapy are to improve quality and quantity of life by relieving symptoms and improving exercise tolerance. To achieve this reduction in morbidity and mortality, polypharmacy for heart failure is necessary.[5] Although bedrest for a patient with heart failure was recommended in the past, all patients in a stable condition (even those in New York Heart Association [NYHA] Class III) should be encouraged to exercise. Left ventricular dysfunction results in skeletal muscle abnormalities that in turn increase cardiovascular stress. Improving exercise capacity reverses the skeletal muscle abnormalities, improves heart rate response, reduces neurohormonal levels and improves clinical symptoms.[6]

Although digitalis has been used for over 200 years, it remains a controversial agent in the treatment of heart failure. The Digitalis Investigation Group showed that the use of digitalis improved symptoms and functional capacity and led to a reduction in the rate of admissions to hospital. There was, however, no affect on mortality.[7] Accordingly, digitalis is recommended as an adjunct to improve symptoms resulting from left ventricular systolic dysfunction.

Diuretics should be prescribed for all patients with symptoms of heart failure who have a predilection to fluid

retention. The loop diuretics are effective in improving the symptoms and signs of fluid retention such as jugular venous distention or edema, or both. The Randomized Aldactone Evaluation Study of patients with Class III/IV heart failure showed a reduction in both cardiac death and admissions to hospital for deteriorating heart failure in patients receiving active therapy.[8] Whether spironolactone is beneficial in less severe heart failure is not known.

All patients with heart failure due to left ventricular systolic dysfunction should receive an angiotensin-converting-enzyme (ACE) inhibitor, unless they are intolerant of the drug or have a contraindication to its use. Treatment should not be delayed until symptoms are severe or resistant to other drugs. Several landmark studies with ACE inhibitors (CONSENSUS, SOLVD, SAVE) showed the benefit of treating peripheral vasoconstriction and heart failure by inhibiting the rate-limiting enzyme (ACE) in the renin–angiotensin system.[9–12] The entire spectrum of patients with heart failure and left ventricular systolic dysfunction, whether asymptomatic (Class I) or symptomatic to varying degrees (Class II–IV), benefits from therapy with an ACE inhibitor. Total mortality, admissions to hospital, worsening heart failure and recurrent myocardial infarctions are reduced by 20%–25%. Optimal dosing is important.[13] Clinicians should aim for the target doses used in clinical trials. In high-risk individuals (≥ 55 years of age with evidence of vascular disease or diabetes plus one other risk factor) without left ventricular dysfunction or heart failure, ACE inhibitor therapy is recommended to reduce risk of death, myocardial infarction, stroke and progression to heart failure.[14]

Angiotensin-receptor blockers should not be considered to be equivalent or superior to ACE inhibitors in the treatment of heart failure. The ELITE-II trial showed that patients with heart failure had a better long-term outcome when treated with captopril rather than losartan.[15] Angiotensin-receptor blockers should be considered only in patients who are unable to tolerate ACE inhibitors because of cough or angioedema. Whether a combination of ACE inhibitors and angiotensin-receptor blockers should be used remains unknown. The recent Val-HeFT trial showed valsartan to be a safe and effective treatment that reduced mortality and morbidity in patients receiving usual therapy for heart failure, including ACE inhibitors.[16,17] The principal benefit was a reduction in admissions to hospital for heart failure. However, valsartan therapy was not beneficial to patients who were taking a β-blocker, and these patients did better on placebo. Several trials with other angiotensin-receptor blockers are currently taking place.

In patients with heart failure, there is increased sympathetic activity, which can exacerbate the left ventricular dysfunction. In the past, β-blockers have been "contraindicated in heart failure," but several large trials have evaluated their use for this condition.[18–21] Each of these studies showed an improvement in symptoms and clinical status as well as an improvement in cardiac function and survival. β-Blockers are recommended for all patients with heart failure (NYHA Class II–IV), unless they are intolerant of the drug or have a contraindication to its use. It is important to start with the lowest dose and carefully increase the dose.

Heart failure programs have been designed and implemented to reduce rates of readmission to hospital and associated costs. In these Specialty Heart Failure/Function Clinics, practitioners with expertise in heart failure deliver care in an outpatient setting. These programs have demonstrated lower rates of readmission to hospital for all causes and for heart failure, fewer days spent in hospital, and improved quality of life and functional status, as well as lower health care costs despite the increased cost of the programs.[22]

In spite of all the advances in the treatment of patients with heart failure, the mortality rate remains high and the affected population continues to grow. Continued research into new therapies continues. There are several promising areas: vasopeptide inhibitors, endothelin antagonists, tumour necrosis factor and inhibitors, continuous positive airway pressure, biventricular pacing and ventricular assist devices.

Dr. Kostuk is with the Division of Cardiology, London Health Sciences Centre, London, Ont.

Competing interests: None declared.

References

1. Naylor CD, Slaughter P, editors. *Cardiovascular health and services in Ontario: an ICES atlas.* 1st ed. Toronto: ICES; 1999. p. 111-22.
2. Ehrmann Feldman D, Thivierge C, Guérard L, Déry V, Kapetanakis C, Lavoie G, et al. Changing trends in mortality and admissions to hospital for elderly patients with congestive heart failure in Montreal. *CMAJ* 2001;165(8): 1033-6. Available: www.cma.ca/cmaj/vol-165/issue-8/1033.asp
3. Johnstone DE, Abdulla A, Arnold JM, Bernstein V, Bourassa M, Brophy J, et al. Diagnosis and management of heart failure. Canadian Cardiovascular Society. *Can J Cardiol* 1994;10(6):613-31.
4. Vasan RS, Levy D. Defining diastolic heart failure. A call for standardized diagnostic criteria. *Circulation* 2000;101:2118-21.
5. Parneley WW. How many medicines do patients with heart failure need? *Circulation* 2001;103:1611-2.
6. Belardinelli R, Georgiou D, Cianci G, Purcaso A. Randomized, controlled trial of long term moderate exercise training in chronic heart failure: effects on functional capacity, quality of life and clinical outcome. *Circulation* 1999;99:1173-82.
7. The Digitalis Investigation Group. The effect of digoxin on mortality and morbidity in patients with heart failure. *N Engl J Med* 1997:336:525-33.
8. Pitt B, Zannad F, Remme WJ, Cody R, Castaigne A, Perez A, et al. The effect of spironolactone on morbidity and morality in patients with severe heart failure. Randomized Aldactone Evaluation Study. *N Engl J Med* 1999;341: 709-15.
9. The CONSENSUS Trial Study Group. Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS). *N Engl J Med* 1987;316(23): 1429-35.
10. The SOLVD Investigators. Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure. *N Engl J Med* 1991:325(5):293-302.
11. The SOLVD Investigators. Effects of enalapril on mortality and the development of heart failure in asymptomatic patients with reduced left ventricular ejection fraction. *N Engl J Med* 1992;237:685-91.
12. Pfeffer M, Braunwald E, Moyle OL, Basta L, Brown EJ Jr, Cuddy TE, et al. Effect of captopril on mortality and morbidity in patients with left ventricular dysfunction after myocardial infarction. Results of the Survival and Ventricular Enlargement Trial. The SAVE Investigators. *N Engl J Med* 1992;327:669-77.
13. Packer M, Poole-Wilson P, Armstrong PW, Cleland JGF, Horowitz JD, Massie BM, et al. Comparative effects of low and high doses of the angiotensin converting enzyme inhibitor, lisinopril, on mortality and morbidity in chronic heart failure. *Circulation* 1999;100:2312-8.

14. The Heart Outcomes Prevention Evaluation Study Investigators. Effects of an angiotensin-converting enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. *N Engl J Med* 2000;342:145-53.
15. Pitt B, Poole-Wilson PA, Segal R, Martinez FA, Dickstein K, Camm AJ, et al. Effect of losartan compared with captopril on mortality in patients with symptomatic heart failure: randomized trial — The Losartan Heart Failure Survival Study ELITE II. *Lancet* 2000;355:1582-7.
16. Cohn J, Tognoni G, Glazer R, Spormann D, Hester A. Rationale and design of the valsartan heart failure trial. A large multinational trial to assess the effects of valsartan, an angiotensin-receptor blocker, on morbidity and mortality in congestive heart failure. *J Card Fail* 1999;5:155-60.
17. Cohn JN. Results from the Valsartan in heart failure trial [oral presentation]. American Heart Association meeting; 2000 Nov 15; New Orleans (LA).
18. Packer M, Bristow MR, Cohn JN, Colucci WS, Fowler MB, Gilbert EM, et al. The effects of carvedilol on morbidity and mortality in patients with chronic heart failure. U.S. Carvedilol Heart Failure Study Group. *N Engl J Med* 1996;335:1349-55.
19. CIBIS-II Investigators and Committee. The Cardiac Insufficiency Bisoprolol Study (CIBIS-11): a randomized trial. *Lancet* 1999;3553:9-13.
20. MERIT-HF Study Group. Effect of metoprolol CR/XL in chronic heart failure: metoprolol CR/XL randomized interventional trial in congestive heart failure (MERIT-HF). *Lancet* 1998;353:2001-7.
21. Packer M, Coats AJ, Fowler MB, Katus HA, Krum H, Mohacsi P, et al. Effect of carvedilol on survival in severe chronic heart failure. *N Engl J Med* 2001; 344(22):1651-8.
22. Grady KL, Dracup K, Kennedy G, Moser DK, Piano M, Warner Stevenson L, et al. Team management of patients with heart failure. A statement for health care professionals from the Cardiovascular Nursing Council of the American Heart Association. *Circulation* 2000;102:2443-56.

Correspondence to: *Dr. William J. Kostuk, Division of Cardiology, London Health Sciences Centre, University Campus, 339 Windermere Rd., PO Box 5339, Station B, London ON N6A 5A5; fax 519 434-3278; bill.kostuk@lhsc.on.ca*