Intermittent Infusion of Inotropes in the Outpatient Setting: One-Year Post Treatment Analysis

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The course of patients with New York Heart Association (NYHA) class III and IV and refractory heart failure symptoms is characterized by progressive clinical deterioration and frequent hospital readmissions. The value of intermittent intravenous administration of inotropes in managing this group of patients in the outpatient setting has been controversial. In this study, patients with refractory heart failure symptoms were enrolled to assess the impact of a multidisciplinary outpatient program in terms of on hospital admissions, emergency room visits, and interval free of symptoms after administration of inotropes. This is a retrospective analysis on 41 patients with refractory heart failure treated at our outpatient cardiac infusion unit over a 20 month period. Thirteen patients with a NYHA class III [age 64 ± 13; LVEF 27 ± 9%] and 28 patients with a NYHA class IV [age 65 ± 13 years; LVEF 21 ± 9%], mostly males, were included. A total of 65 admissions for decompensated HF were recorded in the previous 6-months prior to initiation of the outpatient program; compared to only 4 emergency room visits and 7 hospital admissions after enrollment. Furthermore, 17 patients have been discharged with improvement in NYHA class from 3.5 ± 0.6 to 1.4 ± 0.5. On these patients, the interval free of symptoms since the last infusion treatment has ranged from 201 to 489 days, without emergency room visits or hospital admissions for congestive heart failure. The results of this study support the use of intermittent infusion of inotropes in the outpatient setting. Although the natural history for patients with refractory heart failure has been grim; the use of these intermittent infusions may in fact alter the natural course of end stage congestive heart failure patients and deserves further investigation.

Key words: Congestive heart failure, Hospital readmissions, Inotropes, New York Heart Association, Outpatient setting, Outcomes.

Congestive heart failure is a chronic debilitating cardiac illness that currently affects over 4 million Americans and its incidence continues to increase with 400,000 new cases expected each year (1,2). Over the past 20 years, death rates for congestive heart failure have increased considerably (3). This increase in death rates is attributed to aging of the population and advances in the treatment of coronary artery disease, valvular heart disease, and hypertension, that prolong life span (4). Patients with congestive heart failure live approximately 4 to 5 years, but nearly all of them have dyspnea and shortness of breath that limits exercise capacity and compromises quality of life (5). The three-year mortality for congestive heart failure is mainly related to severity of symptoms and ranges from 40% in asymptomatic patients with a NYHA class I to 82% in those patients with symptoms at rest, a NYHA class IV (6).

Hospital readmission rates for congestive heart failure range from 16 to 47.5% at one year (7). Half of the readmitted patients have advanced stages of congestive heart failure, requiring costly and prolonged hospital stays (8). Recent estimates showed that congestive heart failure accounts for nearly 1 million hospital admissions per year, at an estimated annual cost in excess of $7 billion or 5.4% of the total Federal health care expenditure (9). Medicare alone spent almost 1.5 times more in hospitalizations for congestive heart failure than for myocardial infarction and twice as much as for all forms of cancer (10).

New interventions are being considered to improve patient's survival and quality of life, and reduce hospital

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admissions and emergency room visits. One such intervention is the intravenous administration of inotropic agents to improve cardiac performance. Traditionally, intravenous infusions of inotropes has been initiated in patients hospitalized with decompensated heart failure and results in dose-dependent hemodynamic benefits (11). There has been a marked increase in the intermittent or continuous use of such therapy in the outpatient setting (11-13). Proponents of these therapies claim that this intervention results in substantial improvement in the quality of life scores and the functional capacity status (12).

We intend to determine the specific impact of intermittent infusion of inotropes on patients with refractory congestive heart failure symptoms, already on optimal standard therapy, referred to an outpatient facility. We identified the number of patients who benefit from outpatient inotrope infusions, the number of emergency room visits and hospital admissions due to congestive heart failure, the change in functional capacity, and the symptom-free interval after the administration of inotropes in the outpatient setting.

Methods

Patient selection. Patients with a NYHA class III and IV and refractory congestive heart failure that were referred to the outpatient cardiac infusion unit were evaluated for this study. All the patients met the following inclusion criteria: a) had refractory symptoms compatible with NYHA class III or IV heart failure; b) were receiving maximal oral therapy with digitalis, diuretics, angiotensin-converting enzyme inhibitors or hydralazine-isosorbide dinitrate combination; and c) confirmation of the cardiac diagnosis by one or more tests (echocardiogram, cardiac catheterization, MUGA scan, or cardiopulmonary stress test). Patients were excluded from participation if they had a) an acute myocardial infarction within three months; b) unstable ventricular arrhythmias within three months; c) aortic or mitral valve stenosis; d) hypertrophic cardiomyopathy; e) intracardiac masses or thrombus; f) history of repeated noncompliance; g) history of alcohol or drug abuse; h) pregnancy. All medications were continued upon admission to the outpatient cardiac infusion unit. Diuretics were given at each session as required, depending on clinical signs and body weight. Potassium and magnesium sulphate supplements were adjusted according to serum levels.

Outpatient cardiac infusion treatments. Once the eligibility criteria were met, the patients were then assigned to receive either intravenous dobutamine or milrinone, as requested by their attending cardiologist. The following doses were used for dobutamine and milrinone: a) low dose was 2.5 mg/Kg/min and 0.375 mg/Kg/min, respectively, b) medium dose was 5.0 mg/Kg/min and 0.50 mg/Kg/min, respectively. During the first two infusion sessions the low dose was administered for one hour followed by two hours of the medium dose and finally concluding with one hour of the low dose. This proved to be both safe and well tolerated by the patients. In the following infusion sessions, the medium dose was then given for four hours with similar tolerance. At each session, individual assessments were performed by a nurse practitioner and a registered nurse.

The following clinical criteria were used in all patients during every session to assess the individual response to each infusion dose: a) systolic blood pressure greater than 90 but less than 150 mmHg; b) heart rate below 130 beats per minute; c) cardiac rhythm without the development of new atrial or ventricular arrhythmias, including premature ventricular depolarizations; and d) free of symptoms such as anxiety, palpitations, chest pain, nausea, vomiting, or increased shortness of breath. If side effects occurred, the dose of the intravenous drug was reduced or discontinued. However, in the event of this occurrence, re-institution of the treatment was encouraged at a later time with a lower infusion dose.

Treatments were started two or three times a week for a 4 hour period. Those patients started on a three times a week schedule were: a) decompensated class IV patients; b) the recently-discharged from a hospitalization for decompensated congestive heart failure; c) those patients whose quality of life score was less than 10; d) those unable to ambulate or with a functional capacity score less than 500 meters. The patients initially started on a two times a week schedule were a) patients with a NYHA class III - IV; b) those with a quality of life score more than 10; c) those with a functional capacity score more than 750 meters. Each treatment cycle was then given for a four to eight week period and symptoms, physical findings, and clinical response reassessed. In case of improvement, the treatment cycle was then continued at the same interval or reduced accordingly. In the cases with continuous symptomatic improvement, infusion therapy was then weaned over a period of four treatments, each one once a week. Upon discharge from the outpatient cardiac infusion unit, patients were then followed at our outpatient congestive heart failure clinic weekly for two visits; biweekly for two visits, monthly for two visits, and then every two months.

The analysis was performed with the intention-to-treat population, to ensure that all patients were included in the analysis, and to avoid bias from missing data. Results are expressed as mean values ± standard deviation. The

distributions of the continuous variables were examined, and all the variables showed normal distribution. Comparison between groups for pre-test differences in independent variables were made using the Student's *t* test for unpaired samples. Analysis of variance with post hoc testing was used for multivariate analysis. The chi-square statistics was used to assess statistical significance for all categorical variables. Participants with missing data were uniformly excluded from the analyses. A p value of less than 0.05 was considered significant.

Results

A total of 41 patients with refractory congestive heart failure fulfilled the entry criteria for the outpatient cardiac infusion unit and were included in this retrospective study. Of the total number of patients, 13 patients had a NYHA class III (mean ± SD age 64 ± 13 years, 9 males) at entry and 28 patients had a NYHA class IV (mean ± SD age 65 ± 13 years, 26 males) as shown in Table 1. Most patients were males, only 6 were females. The calculated left ventricular ejection fraction (mean ± SD) for the NYHA class III group was 27 ± 9 per cent and that for the NYHA class IV group was 21 ± 9 per cent. Coronary artery disease was the most common underlying disorder, 9 patients had ischemic and 4 patients had idiopathic dilated cardiomyopathy among patients with a NYHA class III. In patients with a NYHA class IV, 19 patients had ischemic and 9 had idiopathic dilated cardiomyopathy. During a 20-month period, in which we offered intravenous infusions of inotropes to stable patients with refractory symptoms of congestive heart failure, nine (22%) patients died (6 of progressive congestive heart failure, 2 due to complications after transplant, 1 due to sepsis); six (14%) patients were withdrawn from the program (3 by their primary physicians and 3 because of significant travel limitations); four (10%) patients required continuous intravenous home therapy; seventeen (42%) patients were discharged from the program because of improvement in symptoms, and five (12%) patients are currently receiving active treatment (Table 1). None of the patients was intolerant to the inotrope or inodilator infusion, except for the development of arrhythmias as described below. No other significant side effect was reported. A total of 879 individual outpatient treatment sessions were given, with

Table 1. Demographic and clinical values of the entire patient population enrolled in the outpatient infusion program

Pt (no.)	Age (yr.)	Sex	NYHA Class	LVEF	Indication for Treatment	IV Drug	Dx.	Tx. (no.)	Outcome
1	40	M	IV	20 %	Worsening renal function	D	NISCM	23	On therapy
2	69	M	IV	11 %	Reduce readmissions	D	NISCM	10	On therapy
3	76	M	IV	10 %	Reduce readmissions	D/M	ISCM	6	Died
4	73	M	IV	36 %	Symptoms at rest	M	ISCM	19	Continuous
5	83	M	IV	40 %	Symptoms at rest	M	ISCM	10	Died
6	79	M	IV	10 %	Symptoms at rest	D	ISCM	8	QUIT
7	76	M	III	20 %	Reduced functional capacity	D	ISCM	10	On therapy
8	59	M	IV	14 %	Reduced functional capacity	D	ISCM	16	Died
9	69	M	IV	10 %	Reduce readmissions	M	ISCM	15	Died
10	40	M	IV	24 %	Symptoms at rest	D	NISCM	5	Transplant
11	61	M	III	19 %	Reduced functional capacity	D	NISCM	13	QUIT
12	63	M	III	21 %	Reduced functional capacity	D	ISCM	16	D/H
13	43	M	IV	24 %	Symptoms at rest	D	NISCM	36	D/H
14	32	M	III	15 %	Reduced functional capacity	M	NISCM	11	QUIT
15	71	F	IV	33 %	Symptoms at rest	D	NISCM	17	D/H
16	70	M	IV	22 %	Worsening renal function	D	ISCM	30	D/H
17	57	M	IV	37 %	Symptoms at rest	M/D	ISCM	67	D/H
18	40	M	IV	30 %	Symptoms at rest	M	ISCM	28	Died
19	74	M	IV	9 %	Worsening renal function	D	NISCM	10	Died
20	69	M	IV	19 %	Symptoms at rest	M	ISCM	8	Died
21	55	M	IV	20 %	Reduce readmissions	D	ISCM	10	On therapy
22	64	F	III	40 %	Reduced functional capacity	D/M	NISCM	9	QUIT
23	72	M	IV	22 %	Reduce readmissions	D	NISCM	6	QUIT
24	62	M	IV	7 %	Pre ventriculotomy	M	NISCM	39	Continuous
25	53	M	III	31 %	Symptoms at rest	M	ISCM	76	D/H
26	75	M	III	30 %	Reduced functional capacity	D	ISCM	27	D/H
27	69	F	IV	20 %	Reduced functional capacity	D	ISCM	11	Continuous
28	74	M	III	20 %	Reduced functional capacity	D	ISCM	10	D/H
29	72	M	IV	17 %	Symptoms at rest	D	ISCM	10	QUIT
30	47	M	IV	15 %	Symptoms at rest	D/M	ISCM	13	Continuous
31	70	F	III	35 %	Reduced functional capacity	D	ISCM	28	D/H
32	50	F	III	31 %	Reduced functional capacity	M	NISCM	118	D/H
33	68	M	IV	20 %	Symptoms at rest	D	ISCM	8	Died
34	69	M	IV	30 %	Symptoms at rest	D	ISCM	43	D/H
35	67	M	III	15 %	Reduced functional capacity	D	ISCM	9	D/H
36	51	M	IV	20 %	Symptoms at rest	D	ISCM	24	D/H
37	79	M	IV	21 %	Symptoms at rest	D	ISCM	22	D/H
38	76	M	IV	23 %	Symptoms at rest	D	NISCM	13	D/H
39	80	F	III	35 %	Reduced functional capacity	D	ISCM	18	D/H
40	75	M	III	35 %	Worsening renal function	D	ISCM	17	On therapy
41	57	M	IV	15 %	Reduced functional capacity	D	ISCM	10	D/H
Totals	64 ± 13		3.7 ± 0.5	23 ± 9%				21	

ISCM = ischemic cardiomyopathy, NISCM = non ischemic cardiomyopathy, NYHA = New York Heart Association, D = dobutamine, M = milrinone, D/H = discharged from program

a mean of 21.4 sessions (10.2 ± 2 weeks) per patient (range 5 to 118 sessions).

In all patients, it was quite evident that the potential to estimate either a negative or a positive clinical response to the intermittent infusion of inotropes was noticeable after 8 ± 2 treatment sessions. This clinical response was sustained in all the patients who were eventually discharged from the program. Similarly, a lack of a significant response during the same time period was noted in all the patients that eventually failed therapy and required either admission to the hospital due to intractable heart failure or continuous infusion of the inotrope agent.

A total of 3536 hours of inotrope therapy were administered in the outpatient cardiac infusion unit, over a 20 month period. During this interval, two patients developed new onset atrial fibrillation with controlled ventricular rate; one patient had non-sustained ventricular arrhythmias requiring elective hospitalization for treatment with amiodarone; and one patient had sustained ventricular fibrillation requiring immediate electrical defibrillation and subsequent implantation of an internal cardiac defibrillator device. All these arrhythmias were noted within the first 6 to 8 treatment sessions. None of the patients developed subsequent supra or ventricular arrhythmias.

In terms of the type of agent received during the intermittent outpatient infusion treatments, nine patients received the inodilator, milrinone; four patients received both milrinone and dobutamine at some time during their treatment, and twenty-eight patients received only dobutamine. Of the patients that received milrinone at any time during the treatment, 5 died, 4 required continuous home infusion due to lack of clinical response, 2 were discharged from the program due to symptomatic improvement, and 2 quit the program. Of the patients that were treated with dobutamine, 4 died; 4 quit the program; 5 are still receiving intermittent infusions at our unit with continued improvement and 15 patients had improved enough to be discharged from the program. Although the numbers are to small to derive any statistical analysis, the following findings in our population are evident. Of those patients who received milrinone at any time during treatment 5 patients (39%) died while 2 patients (15%) were eventually discharged from the program due to symptomatic improvement. In contrast, of those patients who received dobutamine at any time during treatment 4 patients (13%) died while 15 patients (47%) were eventually discharged from the program due to symptomatic improvement.

A second remarkable finding of this study, in addition to the number of patients discharged from the program due to symptomatic improvement, was the decrease in emergency room visits and hospital admissions for this group of patients (Table 2). Most remarkable, was the fact that in the group of 41 patients, there were 65 admissions for decompensated congestive heart failure in the previous 6-months prior to initiation of the outpatient program; compared to only 4 emergency room visits and 7 hospital admissions after starting the program.

Table 2. Distribution of emergency room visits and hospital admissions for the total patient group.

Patient	ER visit	Hospital admission
1	Nausea and vomiting	Cholelithiasis
1	None	Mental changes
3	None	Decompensated heart failure
4	Fever and toe pain	Toe amputation
4	Mental changes	Hypoglycemia
5	Shortness of breath	Decompensated heart failure
5	Shortness of breath	Decompensated heart failure
8	None	Status I heart transplant-list
10	None	Status I heart transplant list
11	None	Transplant work-up
12	None	Takedown of an enterocutaneous fistula
14	Mental changes	Illicit drug overdose
18	None	Status I heart transplant list
19	None	Decompensated heart failure
20	None	Abdominal pain
20	None	Sepsis
23	None	Ventricular tachycardia
24	Shortness of breath	Decompensated heart failure
27	Shortness of breath	Decompensated heart failure
29	None	Failure to thrive
30	None	Hypotension
30	Chest pain	Rule out myocardial infarction
33	Syncope	Negative EPS
33	None	Sepsis
34	None	Decompensated heart failure
36	None	Syncope: inducible VT on EPS (ICD)
38	None	Start amiodarone therapy
41	Fever and chills	Sepsis

A total of 11 emergency room visits were recorded, only 4 were related to decompensated congestive heart failure. In terms of hospital admissions, 11 (39%) admissions were not related to any cardiac complaints; 7 (25%) admissions were due to decompensated congestive heart failure, 4 (14%) admissions for heart transplant; 3 (11%) admissions for arrhythmia evaluation and 3 (11%) admissions for sepsis. Six patients were readmitted twice for separate medical issues. Nineteen patients never required a single

emergency room visit or hospital admission. The reduction in hospital readmissions was probably related to the statistically significant improvement seen in NYHA class after initiation of the outpatient infusion program.

Another remarkable finding of this study was the persistent symptom-free interval after administration of inotropes in the outpatient setting. The length of time (mean ± SD) without evidence of congestive heart failure decompensation since the last infusion treatment has been 186 ± 100 days (range 60 to 356 days) on those patients who improved enough to be discharged from the program. The total amount of days since the last infusion treatment for each individual patient, that completed the administration of inotropes in the outpatient setting, is shown in Figure 1. None of these patients had required emergency room visits or hospital admissions. The patients had maintained their functional status since completion of therapy.

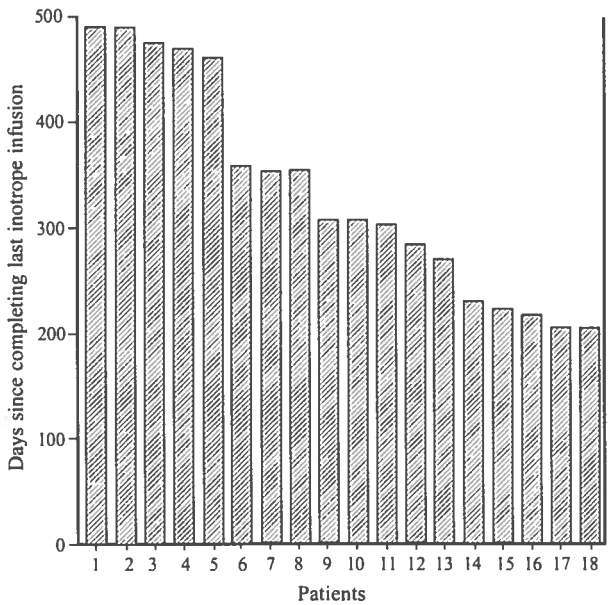

Figure 1. Bar graph representation of the individual days since completion of the intermittent outpatient inotrope infusion program for each consecutive patient discharged from the outpatient infusion unit.

There were no deaths in the 14 NYHA class III patients enrolled in our study and 8 patients (57%) successfully completed inotrope therapy (Figure 2). In contrast, of the 27 patients with NYHA class IV, 8 (30%) died and 9 (33%) completed therapy. These results might suggest that earlíer initiation of therapy may alter the natural progression of this chronic debilitating cardiac illness and patient benefit may be obtained before overt cardiac decompensation has already established.

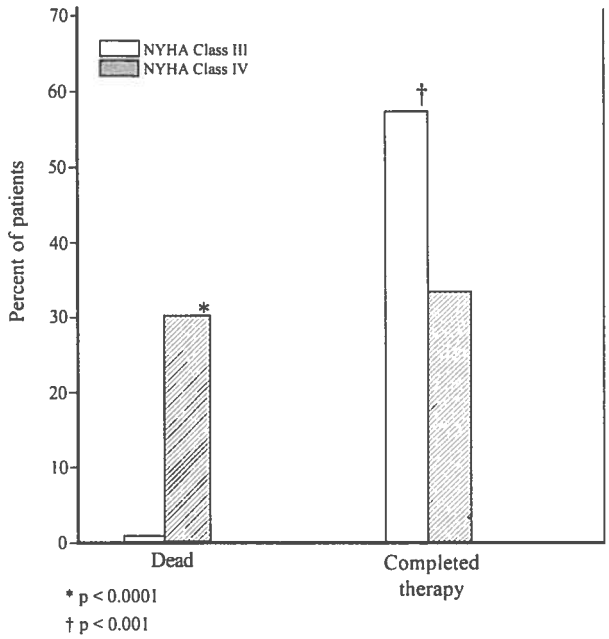

Figure 2. Comparison of outcomes from patients in terms of their initial NYHA class.

Discussion

Our data supports previous reports suggesting that the intermittent administration of inotropes in the outpatient setting is well accepted and tolerated by patients with refractory heart failure. In this study, four findings deserve particular attention. First, that this is the first report to ascertain therapy outcome as early as between 6 to 10 treatment session of the intermittent infusion of inotropes. Second, that 42% of the patients admitted to the outpatient cardiac infusion unit to receive treatments, two to three times a week, for a period of 4 to 6 hours, were discharged from the program due to symptomatic improvement. Thus, a percentage of patients with symptoms refractory to conventional standard therapy showed improvement. Third, that the total number of emergency room visits and hospital admissions due to decompensated heart failure symptoms was low. And fourth, that there has been a persistent clinical benefit for those patients that completed the program without recurring signs or symptoms of heart failure decompensation.

Previous reports have demonstrated that short-term, intermittent intravenous inotropic therapy can be safely administered to patients in the outpatient setting (11-16). Widely cited mechanisms to explain this clinical response, include the activation of myocardial and vascular cAMP,

increased intracellular calcium levels, and subsequent improvement in myocardial contractile protein apparatus (17-22). These in turn results in enhanced inotropy, reduced afterload, and reduced preload that is translated into improved left ventricular performance that improves functional class, exercise tolerance, and for some, improves quality of life (11-16).

However, despite these improvements in myocardial perfusion-energetics and associated drug-induced peripheral processes, some arguments can be raised against the use of intravenous inotropes as the sole responsible intervention resulting in clinical benefit in patients with refractory heart failure. First, the potential hemodynamic benefits obtained by the use of inotropes, may be offset by an increase in the number of sudden deaths seen in earlier trials. In 1986 a parallel-controlled multicenter trial using dobutamine was interrupted prematurely due to a substantial higher mortality in the dobutamine-treated group (16). Closer examination of this trial revealed that the infusion protocol was too aggressive, for dobutamine was continuously infused in relatively high doses over a 48-hour period every week. Also, oral inotrope agents have shown adverse effects on morbidity and mortality during long-term use. However, in a recent publication, DeMarco reviewed the trials using nonglycoside inotropes and this summary disputes that these agents result in an excess number of deaths due to proarrhythmia (13). Third, in addition to the use of inotropes, close patient monitoring with frequent administration of intravenous diuretics and potassium replacement, as well as patient education was part of our protocol. Some investigators have recently shown that these interventions, as used in our study, resulted in a significant improvement in patients treated in an outpatient setting (23). Therefore, the focused nature of our multidisciplinary program and the fact that it had multiple components may provide a sound explanation to account for the benefits observed in our study. Fourth, the concomitant optimization of drugs already proven to reduce morbidity and mortality in patients with congestive heart failure such as angiotensin converting enzyme inhibitors (ACEi), angiotensin II blockers (Ang II) and β-blockers could had been a crucial part in the improvement of our patients (24-30). However, since most of the patients in our study were receiving dobutamine, β-blocker use was limited. Furthermore, with a high number of patients with renal insufficiency or intolerant to ACEi, the preferred alternate substitute was the hydralazine-isosorbide dinitrate combination and only one patient was treated with an Ang II. Therefore, based on this drug profile, it will then be difficult to negate the potential effect of inotropes.

In view of these apparent conflicting views, a prospective randomized double blinded placebo-controlled study is needed to fully assess the independent and possible additive effects of a multidisciplinary focused program intervention with that of the intravenous administration of inotropic agents. Furthermore, more data is needed regarding the variables to consider when deciding on either dobutamine or milrinone for a particular patient. Particularly, in view of the results noted in our study regarding discrepancies in terms of case fatalities and number of patients discharged from the infusion program because of improvement in symptoms on dobutamine as compared to milrinone. Such a trial is currently in he planning stage.

In terms of arrhythmic complications during the intermittent infusion of inotropes, we noticed a small number of arrhythmic events. These were limited to the first 6 to 8 treatment sessions. Beyond this time period, none of the patients developed any subsequent supra-or ventricular arrhythmias. The only patient in our study that had ventricular tachycardia/fibrillation was identified prior to entering the program as a high-risk individual for a ventricular arrhythmia. Furthermore, no sudden cardiac deaths have been reported in our patient population since treatments had been started over a 20-month period. These findings support the concept that although telemetry monitoring is certainly essential during early therapy, its need and the cost associated with continued monitoring afterwards needs to be prospectively evaluated.

Hospital readmission represents a useful outcome for analysis, reflecting both the frequency of clinical decompensation and the major component of cost for heart failure. In other studies, the major cause of hospital readmission is usually heart failure decompensation and reflects the severity of the heart failure (31). In our study, only 7 hospital admissions were due to intractable heart failure and 4 additional hospital admissions were for cardiac transplant, during a 20-month treatment period. Only 4 emergency room visits were attributed to decompensated congestive heart failure. These results argue favorably for this multidisciplinary approach; particularly when compared to the projected 90-day readmission rate of 42%, without intervention and at least three or more hospitalizations in patients with refractory heart failure as documented by Rich et al. (32). Furthermore, Fonarrow and associates reported an 85% decrease in the hospitalization rate in the six month period after referral to an outpatient comprehensive program without the use of inotropes (23).

One of the most remarkable observations, noted from this study, relates to the length of time free of any evidence of heart failure decompensation since the last infusion

treatment (331 ± 105 days; range 201 to 489 days), on patients discharged from the program. Furthermore, during this time, only one patient was readmitted to the hospital due to a non-Q wave myocardial infarction and died of ventricular arrhythmias that appeared 310 days after the last infusion. One patient has required multiple admissions to the hospital due to infections associated to hemodialysis but has not required any cardiac medication adjustments. The other 15 patients have not required any emergency room visits, admission to the hospital or any unscheduled office visit. Most remarkably, no further adjustment in medical therapy has been required during follow-up, with the exception of occasional diuretic adjustment for fluctuations in body weight. To our knowledge, there are no similar reports in the literature regarding this finding.

Only 41 patients were enrolled in this study with significant functional impairment and relatively compromised left ventricular ejection fraction. However, with a mean age of 65 ± 13 years and a high prevalence of ischemic cardiomyopathy (68%); the applicability of these results to other patients requires further study. The mortality observed in our group was 19%. Although this mortality is somewhat higher than the 11% reported among transplant candidate groups, our patients were older and had more comorbid conditions (33). In this group, mostly composed of elderly patients, poor compliance and fewer support systems are additional recognized limitations that may account to the higher mortality rates observed in this study (32).

Our study results support the findings of previous reports that recommend the use of intermittent infusion of inotropic therapy in the outpatient setting for patients with refractory symptoms of congestive heart failure. Specifically, our data suggests that the therapeutic intervention presented in this study offers the potential for a significant and sustained clinical improvement for many patients with refractory heart failure. With this approach, patients spend more time at home and less emergency room visits and hospital admissions are needed for decompensated heart failure. In addition, clinical parameters to ascertain therapy outcome are easily identified between the 6 to 10 treatment sessions of the intermittent infusion of inotropes to determine which patient will do well. Therefore, the implementation of this intermittent infusion of inotropic agents may be worth the risk to deliver, especially when no other therapeutic alternative is available. Furthermore, although the numbers are too small to derive any statistical analysis, our findings at least suggest that earlier initiation of this therapy should be considered since it may alter the natural progression of this chronic debilitating cardiac illness.

Resumen

En este estudio retrospectivo se describen los resultados obtenidos en 41 pacientes ambulatorios con fallo cardíaco severo que fueron tratados con infusiones intravenosas de agentes inotrópicos. Las variables estudiadas para determinar el potencial terapéutico de este tratamiento fueron el número de visitas a sala de emergencia y las hospitalizaciones a causa de fallo cardíaco decompensado. En adición, se contabilizó el tiempo que los pacientes permanecieron libres de síntomas de decompensación cardíaca. En general este tratamiento fue bien tolerado ya que sólo 4 visitas a sala de emergencia y 7 hospitalizaciones debido a fallo cardíaco decompensado ocurrieron durante el periodo de tratamiento. Esto compara favorablemente con las 65 admisiones requeridas en los seis meses previos al estudio. A tenor con esta mejoría se observó una reducción substancial en la clasificación de la New York Heart Association al empezar el tratamiento con la clasificación al terminar el mismo (3.5 ± 0.6 versus 1.4 ± 0.5, respectivamente). Finalmente, el tiempo en que estos pacientes permanecieron libres de síntomas de decompensación cardíaca desde la última infusión del agente inotrópico, varió de 201 a 489 días; sin una visita a sala de emergencia o necesidad de hospitalización. Los resultados de este estudio corroboran el beneficio del uso de infusiones de agentes inotrópicos en pacientes ambulatorios con insuficiencia cardiaca. Proponemos que aunque el pronóstico de pacientes con fallo cardíaco congestivo continúa siendo pobre, el uso de infusiones intravenosas de agentes inotrópicos en pacientes ambulatorios es una alternativa terapéutica. Puede alterar favorablemente el curso clínico de estos pacientes por lo que su uso merece ser intentado con mayor frecuencia mientras se continúa con la investigación más a fondo de esta modalidad terapéutica.

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