Case study

Effectiveness of Heart Failure Reversal Therapy in Chronic Heart Failure patient with progressive evaluation of NT-pro BNP: A case report

ABSTRACT

There is need to search for alternative form of therapy which will not only limit he disease but also overcome hindrances encountered with conventional medications used for treatment of heart failure. There is paucity of evidence on effect of Heart failure reversal therapy (HFRT) on N-terminal pro B-natriuretic peptide (NT-pro BNP) levels in patients of chronic heart failure, hence we report 3 cases of chronic heart failure who was treated with HFRT. All the 3 cases had symptoms like dyspnea on exertion (grade 4), chest pain referred to left arm, palpitations, giddiness. Their echocardiography had revealed reduced left ventricular ejection fraction, left ventricular dysfunction. Amongst the investigations, most noteworthy finding was raised NT-pro BNP which was 909, 608, and 956 pg/ml. Patients were given diet kit consisting of less calories (1000 calories), low carbohydrate, moderate protein and fat, high antioxidant capacity. HFRT was given to the patient in the form of *Snehana* (~therapeutic oleation*), Swedana* (~sudation therapy)*, Basti* (~therapeutic enema) and *hrudaydhara* (~thoracic drip therapy) was administered to the patient twice in a week for 12 weeks. Post therapy there was uniform improvement in vital parameters, echocardiography and NT-pro BNP values. The present case study highlighted synergistic effect of HFRT and portion and calorie control diet in improving not only clinical but also prognostic parameters of the disease.

KEYWORDS

Heart failure, NT-proBNP, Ayurveda, Panchakarma, Heart failure reversal therapy.

INTRODUCTION

The global prevalence of chronic heart failure (CHF) is increasing, with an annual incidence of 0.5–1.8 million in India. [1] Along with the symptoms of CHF, a variety of negative emotions, such as worry and

anxiety about the patient's health state, contribute to a drop in the patient's morale and a steady loss in quality of life (QoL). Despite advancements in treatment medications and technology, the prognosis for CHF remains dismal. Thus there is need to search for alternative form of therapy which will not only limit he disease but also overcome hindrances encountered with conventional medications used for treatment of heart failure.[1]

Higher levels of brain natriuretic peptide (BNP) and N-terminal proBNP (NT-proBNP) are linked to a worse prognosis in chronic HF, according to the National Institute for Health and Clinical Excellence (NICE) recommendation.[1] For people with suspected HF with BNP C100 pg/mL or NT-proBNP C400 pg/mL, the NICE guideline suggests transthoracic Doppler 2D echocardiography and expert examination. The use of BNP and NT-proBNP to acquire prognostic information in people with HF is recommended in a 2013 Canadian guideline.[2] European HF guidelines have also mentioned NT-pro BNP as a major prognostic marker in patients of chronic HF. Improvement on NT-proBNP values are known to be associated with good prognosis in these patients.[3]

Heart failure reversal therapy (HFRT) is a Ayurvedic therapy that combines herbal medicine with panchakarma and other complementary therapies. Toxins are reported to be eliminated via panchakarma treatments such as *Snehana* (~therapeutic oleation), *Swedana* (~sudation therapy), *Hrudaydhara* (~thoracic drip) and *Basti* (~a sort of therapeutic enema).[4]

There is paucity of evidence on effect of HFRT on NT-proBNP levels in patients of chronic heart failure, hence we report 3 cases of chronic heart failure who was treated with HFRT and effects were noted in vital parameters and NT-proBNP.

PATIENT INFORMATION

Case 1 was a 72 years old male came with chief complaints of dyspnea on exertion (grade 4), chest pain referred to left arm, palpitations, giddiness, heaviness in chest and disturbed sleep since 7 days. Case 2 was a 44 years old female came to Madhavbaug clinic with chief complaints of dyspnea on exertion (grade 4), upper backache, heaviness in chest, palpitations, giddiness, constipation since 7 days and occasional per rectal bleeding. She is known case of hypothyroidism. Case 3 was a 41 years old female came to Madhavbaug clinic with chief complaints of dyspnea on exertion (grade 4), upper backache,

palpitation, dry cough, anorexia, flatulence, heart burn, nausea since 15 days. The patient was a known case of Rheumatic heart disease with atrial fibrillation and was hospitalized for acute pulmonary oedema in January 2020.

TIMELINE: Timeline is depicted in figure 1.

CLINICAL FINDINGS

On examination of case 1, there was bilateral pedal edema. Patient was diagnosed as chronic heart failure with post PTCA with coronary artery disease with ischemic heart disease. **Case 2 was diagnosed as** chronic heart failure with hypothyroidism with obesity, while case 3 was diagnosed as rheumatic heart disease with chronic heart failure with angina.

DIAGNOSTIC ASSESSMENT

Case 1 had a history of percutaneous transluminal angioplasty (PTCA) diagnosed ischemic heart disease with reduced ejection fraction. The patient had 80%, 99%, 100% block in left anterior descending coronary artery, left circumflex and right coronary arteries, respectively on angiography. One year after PTCA was done, patient landed up in cardiogenic shock and later again hospitalized for heart failure. Amongst the investigations, most noteworthy finding was raised NT-pro BNP which was 909 pg/ml. Echocardiography had revealed left ventricular ejection fraction (LVEF=30%), severe left ventricular dysfunction, moderate pulmonary artery hypertension, grade 3 diastolic dysfunction, severe mitral regurgitation.

In Case 2 echocardiography revealed LVEF=25%, dilated left ventricle, global hypokinesia of left ventricle, severe left ventricular dysfunction, mild mitral regurgitation. Her NT-proBNP was raised i.e. 608 pg/ml. In case 3 echocardiography revealed LVEF=30%, severe mitral stenosis, concentric left ventricular hypertrophy, dilated left atrium, severe pulmonary, global hypokinesia of left ventricle.

THERAPEUTIC INTERVENTIONS

Patients were given Heart failure reversal diet kit consisting of less calories (1000 calories), low carbohydrate, moderate protein and fat, high antioxidant capacity. HFRT was given to the patient in the form of *Snehana, Swedana, Hrudaydhara and Basti* was administered to the patient twice in a week for

12 weeks. Cases 1 and 3 received base therapy of ischemia reversal therapy consisting of Snehana, Swedana and Basti followed by HFRT [table 1].[4]

FOLLOW-UP AND OUTCOME

After end of HFRT therapy, there were no clinical complaints or any clinical findings except in case 2 wherein severity of symptom was drastically reduced as compared to baseline. Rest of the findings are given in tables 2,3,4.

NT pro-BNP was reduced significantly in all the 3 cases after HFRT therapy (figure 2).

Table 1: Study Treatment: Heart Failure Reversal Therapy (HFRT)

Step of HFRT	Type of Therapy	Herbs used for therapy	Duration of Therapy
Snehana	Massage or external oleation (centripetal upper strokes directed towards heart)	10 grams *Terminalia. Arjuna (Roxb.)*, 10 grams *Dashamoola* and 5 grams *Vitex negundo (Linn.)* [100 ml extract processed in sesame oil]	30-35 minutes
Swedana	Passive heat therapy	*Dashmoola* (group of ten herbal roots) with steam at $\leq$ 40 degrees Celsius)	10-15 minutes + 34 minutes of relaxation after procedure
Hrudaydhara	Decoction dripping therapy from a height of 7-8 cm	Luke-warm *dashmoola* decoction	15 minutes
Basti	Administered via rectal route, should be in body for $\geq$ 15 minutes for maximum absorption	1.88 grams Terminalia. Arjuna (Roxb.), 0.42 grams *Boerhavia diffusa (Linn.)* and 0.18 grams *Acorus calamus (Linn.)* [10 ml aqueous extract]	10 minutes

	Parameters		Baseline (18/11/21)	1st F/U (15/2/22)

Case 1	C/F		dyspnea on exertion (grade 4), chest pain referred to left arm, palpitations, giddiness, heaviness in chest and disturbed sleep	Nil
	Vitals	Heart rate (bpm)	88	70
		B.P. (mm Hg)	136/80	90/60
		VO2max	15.98	24.98
	Anthropometry	BMI	32.1	25.4
		Abdominal girth	120	NA
	Investigations	Hb	11.2	12.8
		Serum lipids	TC-188, TG-160, HDL-38, LDL-98	TC-122, TG-103, HDL-42, LDL-59.4
		BSL	85	96
		2D ECHO	LVEF=30%,severe left ventricular systolic dysfunction,Severe MR,Grade 3 D.D.,Moderate RV hypokinesia,Moderate PAH	LVEF=43%,moderate systolic dysfunction,no PAH, moderate MR
		NT proBNP	909	365
	Number of allopathic medications		8	1

Table 2: Changes in various clinical parameters before and after Heart Failure Reversal Therapy (HFRT).

Table 3: Changes in various clinical parameters before and after Heart Failure Reversal Therapy (HFRT).

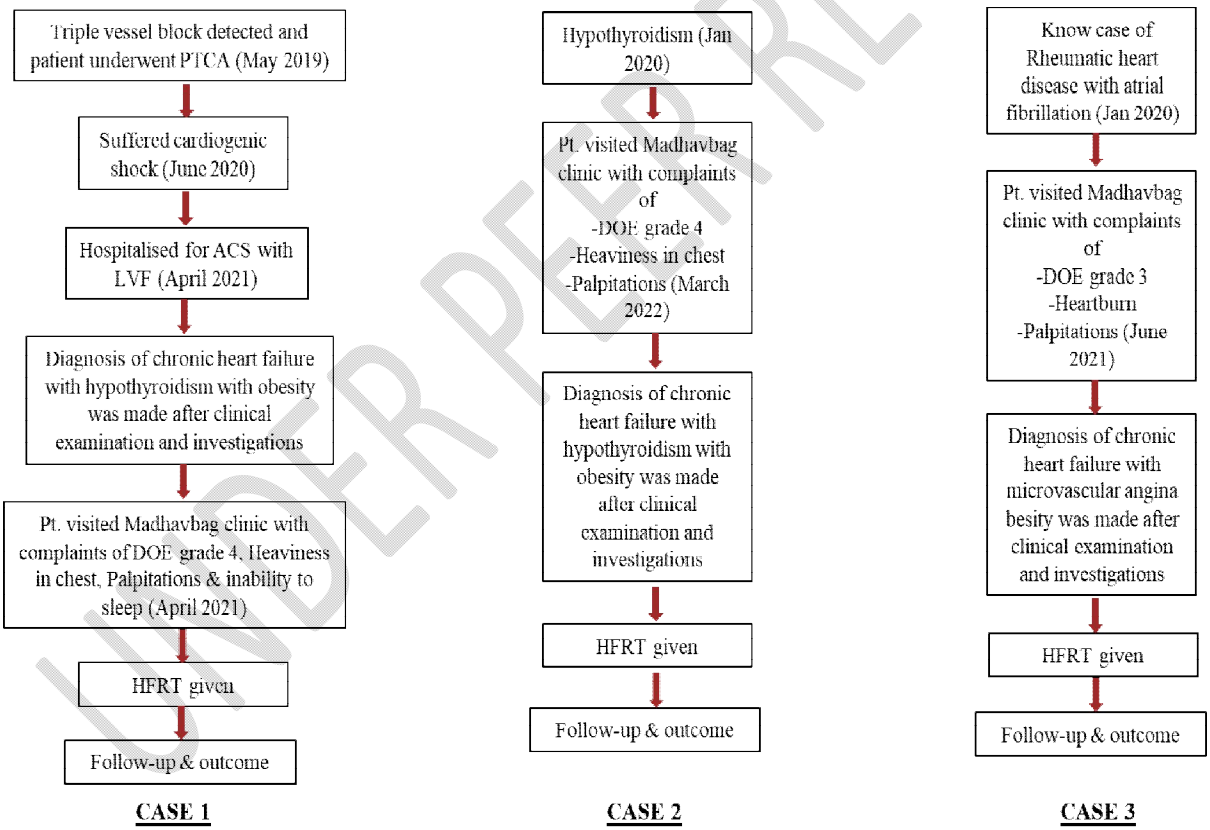
	Parameters		Baseline (14/3/22)	1st F/U (19/5/22)
Case 2	C/F		DOE grade 4,heaviness in chest, palpitations,giddiness	DOE grade 1
	Vitals	Heart rate (bpm)	71	75
		B.P. (mm Hg)	90/60	90/60
		VO2max	18.98	22.12
	Anthropometry	BMI	33	25.4
		Abdominal girth	102	NA
	Investigations	Hb	11.4	NA
		Serum lipids	TC-240, TG-200, HDL-39, LDL-161	TC-194, TG-208, HDL-32, LDL-121
		BSL	90	NA
		2D ECHO	LVEF=25%,global hypokinesia of LV,severe LV dysfunction	LVEF=35.49%,moderate LV dysfunction, no diastolic dysfunction
		NT proBNP	608	435
	Number of allopathic medications		5	2

Table 4: Changes in various clinical parameters before and after Heart Failure Reversal Therapy (HFRT).

	Parameters		Baseline (26/8/21)	1st F/U (17/12/2021)
Case 3	C/F		Gr 3 D.O.E,palpitations,Cough ,anorexia,heartburn	Nil
	Vitals	Heart rate (bpm)	153	62
		B.P. (mm Hg)	112/76	94/62
		VO2max	9.92	24.98
	Anthropometry	BMI	20.5	19
		Abdominal girth	85	80
	Investigations	Hb	11.8	11.5
		Serum lipids	TC-199, TG-122, HDL-46, LDL-128	TC-247, TG-204, HDL-44, LDL-162
		BSL	109	NA

		2D ECHO	LVEF=30%,RHD-severe MS,concentric LVH,severe PAH,global hypokinesia of LV,moderate MR/AS,mild AR	LVEF=63%,RHD-severe MS,moderate AR /AS/TR,moderate PAH,normal biventricular function
		NT proBNP	956	320
	Number of allopathic medications		7	2

Figure 1: Timeline of clinical presentation of 3 patients of current case reports.



DISCUSSION

When compared to healthy people, CHF sufferers have a lower rate of O2 uptake, which causes exhaustion and poor recovery after activity. As a result, improving VO2peak (Volume Oxygen peak), a validated measure of O2 intake, can aid in improving CHF prognosis.[5] Increased VO2peak in CHF patients has been observed in earlier research, however the intervention was not the same as ours.[6]

According to a retrospective study of coronary heart disease patients, a 1-unit (mL/kg/min) increase in VO2peak is linked to a 15% reduction in the risk of mortality.[7] The capacity for exercise of a patient, as assessed by VO2peak, was therefore thought to be a powerful predictor of death. A considerable increase in VO2peak of 56.32 percent at the end of HFRT therapy may imply a decrease in the risk of death in CHF patients, according to the current study.

HFRT in the form of 4 *Panchakarma* procedures namely, *Snehana, Swedana, Hrudaydhara, Basti* were used in the patient. It's been hypothesized that *Snehana* i.e. centripetal oleation reduces sympathetic activity, resulting in a decrease in vascular tone and an increase in vasodilator reserve. Additionally Arjuna oil is known to possess anti-inflammatory and antihypertensive action. *Swedana* i.e. thermal vasodilation causes increased sweating, which can contribute to peripheral vasodilation and a reduction in systemic vascular resistance. As a result, the afterload will be reduced, the cardiac work load will be reduced, and the myocardial oxygen demand will be reduced. A rise in body temperature caused by passive heating raises cutaneous vascular conductance, resulting in an equal increase in systemic conductance.[8] *Hridaydhara,* also known as thoracic drip will cause the patient to relax both emotionally and physically, which may have a favourable influence on the patient's blood pressure. Moreover, this procedure is known to improve blood circulation to respiratory muscles thus helping to reduce dyspnea on exertion.[9]

Basti reduced immunological responses in obese individuals by reducing pro-inflammatory cytokines, immunoglobulins, and T-cell functional characteristics, according to studies. These alterations are linked to a reduction in body weight, which is maintained even after three months of treatment.[10] This discovery might explain why Basti is effective in patients with chronic heart failure. Additionally low carbohydrate and moderate fat and protein diet also contributes to weight loss and reduced BMI, which might contribute

to overall positive effects of HFRT.[3] All these beneficial effects of HFRT were seen as improvements in VO2 max and ejection fraction at the end of therapy.

Patients with a significant drop in NT-proBNP had a reduced future incidence of cardiovascular mortality or HF hospitalization, according to the PARADIGM-HF study.[11] However, it should be emphasized that there is no one cut-off number that represents a normal NT-proBNP level, but an age-based cut-off of 450 pg/mL for people under 50, 900 pg/mL for people between 50 and 75, and 1,800 pg/mL for those over 75 can be considered.[12] The drop in NT-proBNP levels from about 909 pg/mL to 365 pg/mL ninety days after HFRT is notable in the current study, where age of the patient was 72 years. This decrease in NT-proBNP levels indicates that the study population's heart function has improved, indicating that HFRT is effective.

CONCLUSION

There is paucity of data on Ayurvedic therapy in patients with chronic heart failure, particularly its effects on ejection fraction and NT pro-BNP. The present case study highlighted synergistic effect of HFRT and portion and calorie control diet in improving not only clinical but also prognostic parameters of the disease. There is need to perform such studies on large scale so that results can be generalized.

Declaration of patient consent: Written informed consent was obtained from all 3 patients prior to writing the present case report.

REFERENCES

1. National Clinical Guideline Centre (2010) Chronic heart failure: management of chronic heart failure in adults in primary and secondary care. NICE clinical guideline 108. National Institute for Health and Clinical Excellence, Manchester. http://www.nice.org.uk/nicemedia/live/13099/50517/50517.pdf
2. McKelvie RS, Moe GW, Ezekowitz JA, Heckman GA, Costigan J, Ducharme A et al. The 2012 Canadian Cardiovascular Society heart failure management guidelines update: focus on acute and chronic heart failure. Can J Cardiol 2013; 29:168–181.

3. McMurray JJV, Adamopoulos C, Anker S, Auricchio A. ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2012; 33:1787–1847.
4. Sane R, Mandole R, Furia H, Dhamne R, Gharat Y, Joshi S, et al. Efficacy of Heart Failure Reversal Therapy (HFRT) Program in Patients with Preserve Ejection Fraction: An Observational Study. Ayurpub 2018; III(5): 1048-105.
5. Kemps HM, De Vries WR, Hoogeveen AR, Zonderland ML, Thijssen EJ, Schep G. Reproducibility of onset and recovery oxygen uptake kinetics in moderately impaired patients with chronic heart failure. Eur J Appl Physiol. 2007;100(1):45–52.
6. Piepoli MF, Davos C, Francis DP, Coats AJ. ExTraMATCH Collaborative. Exercise training meta-analysis of trials in patients with chronic heart failure (ExTra-MATCH). BMJ. 2004;328(7433):189.
7. Keteyian SJ, Brawner CA, Savage PD. Peak aerobic capacity predicts prognosis in patients with coronary heart disease. Am Heart J. 2008;156(2):292–300.
8. Rowell LB, Detry JR, Profant GR, Wyss C. Splanchnic vasoconstriction in hyperthermic man: role of falling blood pressure. J Appl Physiol. 1971; 31:864–9.
9. Hulsmans M, Sager H, Roh J, Valero-Muñoz M, Houstis N, Iwamoto Y. Cardiac macrophages promote diastolic dysfunction. The Journal of Experimental Medicine. 2018;215(2):423-40.
10. Thatte U, Kulkarni A, Ghungralkar R, Panchal F, Vetale S, Teli P. Immunological & metabolic responses to a therapeutic course of Basti in obesity. Indian Journal of Medical Research. 2015;142(1):53-62.
11. Vardeny O, Claggett B, Packer M. Efficacy of sacubitril / valsartan vs. enalapril at lower than target doses in heart failure with reduced ejection fraction : the PARADIGM-HF trial with ACEI to Determine Impact on Global Mortality and Morbidity in Heart. Eur J Heart Fail. 2016: 1–7.
12. Januzzi JL, Van Kimmenade R, Lainchbury J. NT-proBNP testing for diagnosis and short-term prognosis in acute destabilized heart failure: An international pooled analysis of 1256 patients: The international collaborative of NT-proBNP study. Eur Heart J. 2006; 27:330–337.