

# Effectiveness of Heart Failure Reversal Therapy in Chronic Heart Failure Patient with the Progressive Evaluation of NT-pro BNP: A Case Report

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

## Article Information

### Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here:

<https://www.sdiarticle5.com/review-history/94071>

**Case Study**

**Received 03 October 2022**

**Accepted 07 December 2022**

**Published 14 December 2022**

## ABSTRACT

There is a need to search for an alternative form of therapy that will not only limit the disease but also overcome hindrances encountered with conventional medications used for the treatment of heart failure. There is a paucity of evidence on the 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 were treated with HFRT. All the 3 cases had symptoms like dyspnea on exertion (grade 4), chest pain referred to the left arm, palpitations, and giddiness. Their echocardiography revealed reduced left ventricular ejection fraction and left ventricular dysfunction. Amongst the investigations, the most noteworthy finding was raised NT-pro BNP which was 909, 608, and 956 pg/ml. Patients were given a diet kit consisting of fewer calories (1000 calories), low carbohydrate, moderate protein and fat, and 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 a uniform improvement in vital

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parameters, echocardiography, and NT-pro BNP values. The present case study highlighted the 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; prognostic parameters; NT-pro BNP; panchakarma; heart failure reversal therapy.

## 1. 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 a need to search for an alternative form of therapy that will not only limit the disease but also overcome hindrances encountered with conventional medications used for the 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  $\geq 100$  pg/mL or NT-proBNP  $\geq 400$  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 an 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 a paucity of evidence on the effect of HFRT on NT-proBNP levels in patients with chronic heart failure, hence we report 3 cases of

chronic heart failure who were treated with HFRT, and effects were noted in vital parameters and NT-proBNP.

## 2. CASE PRESENTATION

Case 1 was a 72 years old male who came with chief complaints of dyspnea on exertion (grade 4), chest pain referred to the left arm, palpitations, giddiness, heaviness in the chest, and disturbed sleep for 7 days. Case 2 was a 44 years old female who came to Madhavbaug clinic with chief complaints of dyspnea on exertion (grade 4), upper backache, heaviness in the chest, palpitations, giddiness, constipation for 7 days, and occasional per rectal bleeding. She is a known case of hypothyroidism. Case 3 was a 41 years old female who came to Madhavbaug clinic with chief complaints of dyspnea on exertion (grade 4), upper backache, palpitation, dry cough, anorexia, flatulence, heartburn, and nausea for 15 days. The patient was a known case of Rheumatic heart disease with atrial fibrillation and was hospitalized for acute pulmonary edema in January 2020.

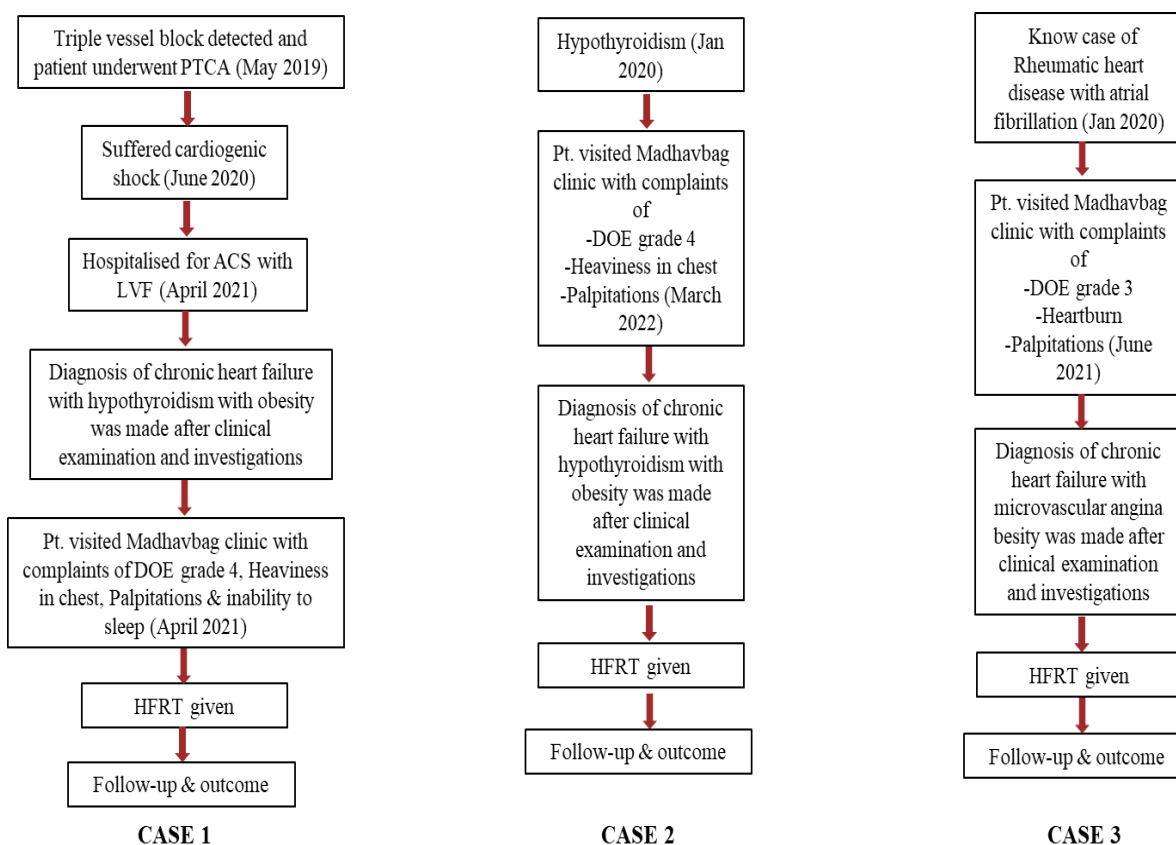
**TIMELINE:** The timeline is depicted in Fig. 1.

## 3. CLINICAL FINDINGS

On examination of case 1, there was bilateral pedal edema. The patient was diagnosed with 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.

## 4. DIAGNOSTIC ASSESSMENT

Case 1 had a history of percutaneous transluminal angioplasty (PTCA) diagnosed with ischemic heart disease with reduced ejection fraction. The patient had 80%, 99%, and 100% block in the left anterior descending coronary artery, left circumflex, and right coronary arteries, respectively on angiography. One year after



**Fig. 1. Timeline of clinical presentation of 3 patients of current case reports**

PTCA was done, the patient landed up in cardiogenic shock and was later again hospitalized for heart failure. Amongst the investigations, the most noteworthy finding was raised NT-pro BNP which was 909 pg/ml. Echocardiography revealed left ventricular ejection fraction (LVEF=30%), severe left ventricular dysfunction, moderate pulmonary artery hypertension, grade 3 diastolic dysfunction, and severe mitral regurgitation.

In Case 2 echocardiography revealed LVEF=25%, dilated left ventricle, global hypokinesia of left ventricle, severe left ventricular dysfunction, and 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.

### 5. THERAPEUTIC INTERVENTIONS

Patients were given a Heart failure reversal diet kit consisting of fewer calories (1000 calories),

low carbohydrate, moderate protein and fat, and high antioxidant capacity. HFRT was given to the patient in the form of Snehana, Swedana, Hrudaydhara, and Basti and was administered to the patient twice 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].

### 6. FOLLOW-UP AND OUTCOME

After the end of HFRT therapy, there were no clinical complaints or any clinical findings except in case 2 wherein the severity of symptoms was drastically reduced as compared to baseline. The rest of the findings are given in Tables 2-4.

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

### 7. DISCUSSION

When compared to healthy people, CHF sufferers have a lower rate of O<sub>2</sub> uptake, which causes exhaustion and poor recovery after activity. As a result, improving VO<sub>2</sub>peak (Volume

Oxygen peak), a validated measure of O<sub>2</sub> intake, can aid in improving CHF prognosis [5]. Increased VO<sub>2</sub>peak 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 VO<sub>2</sub>peak is linked to a 15% reduction in the risk of mortality [7]. The capacity for the exercise of a patient, as assessed by VO<sub>2</sub>peak, was therefore thought to be a powerful predictor of death. A considerable increase in VO<sub>2</sub>peak 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, Hridaydhara, and 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 workload 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 favorable 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, a low carbohydrate and moderate fat and protein diet also contributes to weight loss and reduced BMI, which might contribute to the overall positive effects of HFRT [3]. All these beneficial effects of HFRT were seen as improvements in VO<sub>2</sub> max and ejection fraction at the end of therapy.

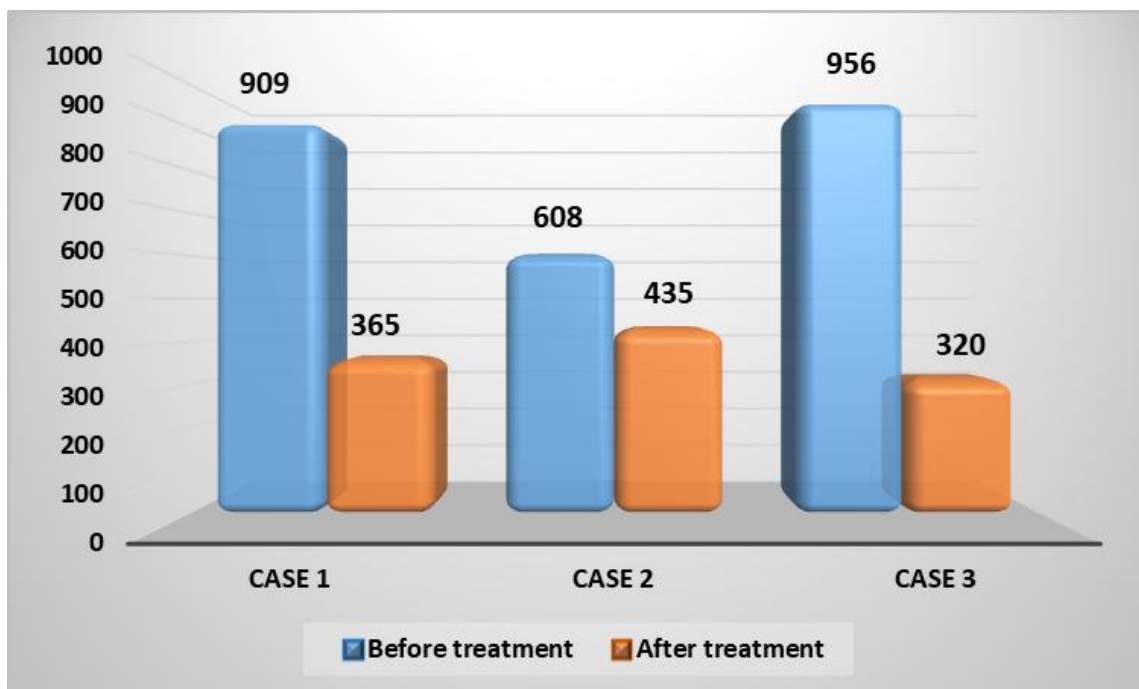


Fig. 2. NT pro-BNP (in pg/ml) before and after completion of therapy

**Table 1. Study treatment: Heart failure reversal therapy (HFRT)**

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

**Table 2. Changes in various clinical parameters before and after heart failure reversal therapy (HFRT)**

| <b>Parameters</b> |                                  | <b>Baseline (18/11/21)</b>  | <b>1st F/U (15/2/22)</b>   |  |
|-------------------|----------------------------------|---|--|--|
| <b>Case 1</b>     | C/F                              | dyspnea on exertion (grade 4), chest pain referred to the left arm, palpitations, giddiness, heaviness in the chest and disturbed sleep | Nil  |  |
|                   | <b>Vitals</b>                    | Heart rate (bpm)  | 88   | 70   |
|                   |                                  | B.P. (mm Hg)  | 136/80   | 90/60  |
|                   |                                  | VO2max  | 15.98  | 24.98  |
|                   | <b>Anthropometry</b>             | BMI   | 32.1   | 25.4   |
|                   |                                  | Abdominal girth   | 120  | NA   |
|                   | <b>Investigations</b>            | 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 3. Changes in various clinical parameters before and after heart failure Reversal therapy (HFRT)**

| <b>Parameters</b> |                                  | <b>Baseline (14/3/22)</b>                                | <b>1st F/U (19/5/22)</b>                                  |  |
|-------------------|----------------------------------|--|---|--|
| <b>Case 2</b>     | C/F                              | DOE grade 4, heaviness in chest, palpitations, giddiness | DOE grade 1   |  |
|                   | <b>Vitals</b>                    | Heart rate (bpm)   | 71  | 75   |
|                   |                                  | B.P. (mm Hg)   | 90/60   | 90/60  |
|                   |                                  | VO2max   | 18.98   | 22.12  |
|                   | <b>Anthropometry</b>             | BMI  | 33  | 25.4   |
|                   |                                  | Abdominal girth  | 102   | NA   |
|                   | <b>Investigations</b>            | 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)**

| <b>Parameters</b> |                                  | <b>Baseline (26/8/21)</b>                            | <b>1st F/U (17/12/2021)</b>  |  |
|-------------------|----------------------------------|--|--|--|
| <b>Case 3</b>     | C/F                              | Gr 3 D.O.E, palpitations, Cough, anorexia, heartburn | Nil  |  |
|                   | <b>Vitals</b>                    | Heart rate (bpm)                                     | 153  | 62   |
|                   |                                  | B.P. (mm Hg)   | 112/76   | 94/62  |
|                   |                                  | VO2max   | 9.92   | 24.98  |
|                   | <b>Anthropometry</b>             | BMI  | 20.5   | 19   |
|                   |                                  | Abdominal girth                                      | 85   | 80   |
|                   | <b>Investigations</b>            | 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  |



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 the 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.

## 8. CONCLUSION

There is a 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 the synergistic effect of HFRT and portion and calorie control diet in improving not only clinical but also prognostic parameters of the disease. There is a need to perform such studies on a large scale so that results can be generalized.

## CONSENT

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

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## ACKNOWLEDGEMENT

Ms Pallavi Mohe from Madhavbaug research and development department for their contribution towards data collection. Mr. Harshal Mahajan for writing assistance and additional editorial support.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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