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Case Report

Ayurveda Section

Synergy of Ayurvedic and Modern Medicine for Improving Left Ventricular Ejection Fraction in Heart Failure Post Myocardial Infarction: A Case Report

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ABSTRACT

Heart failure following a myocardial infarction presents a daunting challenge, with major implications for patient morbidity and mortality. The associated co-morbidities, such as diabetes and hypertension, complicate the treatment course. Managing such patients is challenging and is associated with numerous hurdles that call for an integrated approach for successful management. The present case of a 35-year-old male patient who had previously experienced a Myocardial Infarction (MI) and subsequently developed heart failure with reduced Left Ventricular Ejection Fraction (LVEF). He came to pursue Ayurvedic treatment. The patient was already taking allopathic drugs, which were continued and Ayurvedic interventions were provided alongside them. The Ayurvedic medications included an herbal decoction consisting of *Terminalia arjuna* (Arjuna), *Withania somnifera* (Ashwagandha), *Terminalia chebula* (Haritaki), *Curcuma longa* (Haridra) and *Boerhavia diffusa* (Punarnava), given as 40 mL decoction twice daily before meals. *Prabhakar Vati* (2 tablets of 250 mg each, twice daily before meals along with warm water), *Arjunarishta* (15 mL mixed with 20 mL of warm water twice daily after meals) and *Sarak Vati* (2 tablets of 500 mg each at bedtime along with warm water) were administered for 40 days. Further, external Ayurvedic therapeutic procedures were administered, including *Sarvanga Snehana* (therapeutic oleation of the whole body) with *Bala oil* (for 15 minutes in the morning), *Sarvanga Bashpa Swedana* (steam fomentation) with *Dashamula Kwatha* (for five minutes in the morning) and *Hridaya Basti* (therapeutic retention of oil over the cardiac region) with *Bala oil* (for 20 minutes in the morning) for 40 days. *Matra Basti* (enema with medicated oil) with *Bala oil* (60 mL/day immediately after lunch) was administered for 15 days. After the 40-day treatment regimen, 2D Echocardiography (2D Echo) reports showed a marked improvement in the ejection fraction from 30-35% to 45-50%. There was an improvement in other parameters such as the New York Heart Association (NYHA) classification (from Class III to Class II), the Fatigue Severity Scale (FSS) (score reduced from 56 to 28), the Modified Fatigue Impact Scale (MFIS) (score reduced from 64 to 25) and the pitting oedema grade (from Grade 3 to Grade 1). Thus, Ayurveda offers promising outcomes in enhancing ejection fraction in cases of heart failure following a myocardial infarction.

Keywords: Cardiovascular diseases, *Hridroga*, Hypertension, *Panchakarma*

CASE REPORT

A 35-year-old male patient came to the ayurvedic hospital reporting chest pain, dyspnoea on exertion, fatigue, pitting oedema in bilateral lower limbs and unsatisfactory bowel habits for the past four months. He had been diagnosed with heart failure marked by reduced LVEF, critical thrombotic disease in the Left Anterior Descending artery (LAD) and hypertension about 10 days prior. The coronary angiography report confirmed critical thrombotic disease in the LAD. Additionally, he had a history of anterior wall myocardial infarction and was treated with antiplatelet medications 10-day-ago. A Cardiac Positron Emission Tomography (Cardiac PET) scan revealed left ventricular dysfunction and an infarct in the anteroapical and apicoseptal regions of the myocardium, with evidence of peri-infarct viability in the LAD territory.

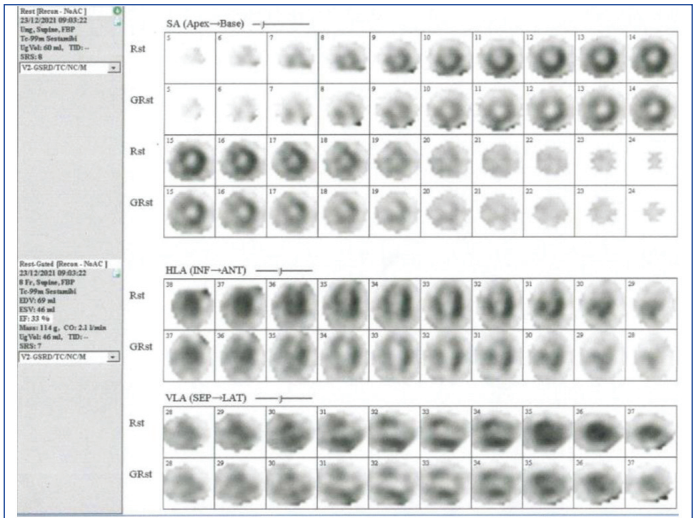
Since then, the patient has been on allopathic medications, including Ecosprin 75 mg once daily, Clopidogrel 75 mg once daily, Atorvastatin 40 mg at bedtime, Spironolactone 25 mg once daily, Metoprolol 12.5 mg once daily and Furosemide 40 mg daily. The patient was also informed that he might need to undergo coronary revascularisation; however, he was unwilling to proceed with this and expressed a desire to pursue Ayurvedic management of his condition. Therefore, after obtaining informed written consent, Ayurvedic medications were initiated alongside his allopathic treatments.

The patient had an average build, with no pallor, icterus, or clubbing of the nails. His vitals included a pulse of 90 beats per minute, a respiratory rate of 18 per minute and an SpO_2 measurement of 97% in room air. His Systolic Blood Pressure (SBP) and Diastolic Blood Pressures (DBP) were 110 mmHg and 70 mmHg, respectively. The rest of the vital signs were within the normal range. A third heart sound was heard during the cardiovascular examination. The systemic examinations of the respiratory, gastrointestinal and central nervous systems revealed no abnormal findings.

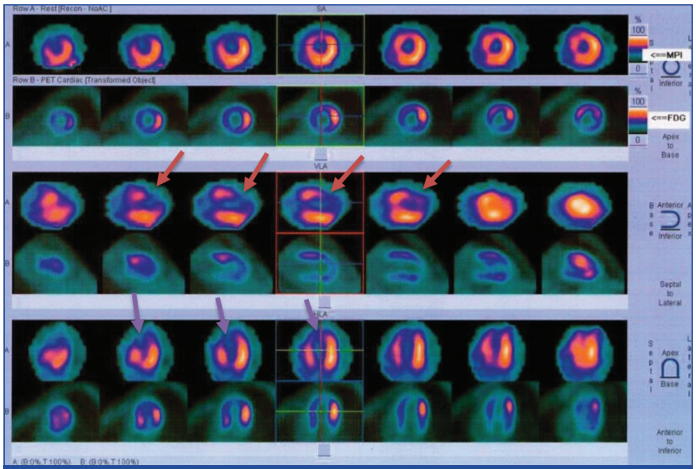
The routine tests, including random blood sugar levels, Complete Blood Count (CBC) and routine and microscopic urine tests, were within normal limits. However, his ECG was abnormal and suggestive of ischemic changes and left ventricular hypertrophy.

The patient had a previous Coronary Angiography report that showed critical thrombotic disease in LAD. Additionally, a Cardiac PET scan was previously performed, which indicated evidence of left ventricular dysfunction and an infarct in the anteroapical and apicoseptal myocardium, along with the presence of peri-infarct viability in the LAD territory [Table/Fig-1,2]. Furthermore, a 2D Echocardiography was conducted, revealing severe SBP left ventricular dysfunction, with a LVEF of 30-35%.

The patient's symptomatic improvement was evaluated according to the New York Heart Association (NYHA) classification criteria for heart failure [1]. The FSS [2] and the MFIS [3] were used to assess fatigue. Pitting oedema was graded based on a scale of 0-4 [4].



[Table/Fig-1]: Cardiac PET-myocardial perfusion study (Black and White)- The image shows myocardial perfusion is normal.



[Table/Fig-2]: Cardiac PET-Myocardial Perfusion Study (Colour)- The image provides evidence of reduced uptake by myocardial tissues. The four orange arrows indicate reduced uptake in the anteroapical myocardial tissues, signifying anteroapical infarction. The three purple arrows indicate reduced uptake in the apicoseptal myocardial tissues, signifying apicoseptal infarction.

The internal Ayurvedic drugs were administered alongside external therapeutic Ayurvedic procedures to the patient [Table/Fig-3]. The oral allopathic medications that the patient was already taking were continued. Additionally, he was given an herbal decoction made from *Terminalia arjuna* (Arjuna), *Withania somnifera* (Ashwagandha), *Terminalia chebula* (Haritaki), *Curcuma longa* (Haridra) and *Boerhavia diffusa* (Punarnava).

The patient experienced significant alleviation in assessment parameters after 40 days of treatment [Table/Fig-4]. The LVEF improved notably, as indicated by the 2D Echocardiography reports taken before and after treatment. The reports show that his LVEF increased from 30-35% to 45-50% post-treatment. Additionally, before treatment, he had severe LV systolic dysfunction, which improved to mildly depressed LV systolic function after treatment. Furthermore, recovery was evaluated using the NYHA Classification, the FSS, the MFIS and the Pitting Oedema Grades (0-4) [Table/Fig-4].

The patient was advised to undergo coronary angiography and cardiac PET after the treatment, but he refused to do so.

Follow-ups

The same Ayurvedic medications were continued for one month. After one month, *Arjunarishta* was discontinued and the rest of the medications were continued for one more month. Following this, the patient returned for a follow-up appointment and noted swelling in both lower limbs, with no further concerns. He was prescribed *Gokshuradi Guggulu* (250 mg)- 1 tablet twice a day before meals, *Arjuna Ghanvati* (250 mg)- 2 tablets twice daily before meals, *Kanchnar Ghanvati* (250 mg)- 1 tablet twice a day before meals and *Gandharva Haritaki* (250 mg)- 2 tablets at bedtime. These medications were continued for three months.

After this, when he returned for a follow-up, he complained of dyspnoea on exertion and a burning sensation in the abdomen. He was then given *Prabhakar Vati* (250 mg)- 2 tablets twice daily before meals, *Triphala Ghanvati* (250 mg)- 1 tablet twice a day before meals, *Amlapitta Mishran* (Dhootapapeshwar)- 10 mL twice a day after meals, *Hridyarnava Rasa* (125 mg)- one tablet twice daily before meals and *Sarak Vati* (500 mg)- two tablets at bedtime. After

Internal ayurvedic medications			
Intervention	**Timing**	**Dosage**	**Duration**
Herbal decoction	7 am and 7 pm (before meals)	40 mL twice a day	40 days
Prabhakar vati (250 mg)	7 am and 7 pm (before meals)	2 tablets twice daily (administered with warm water)	
Arjunarishta	7:35 am and 7:35 pm (after meals)	15 mL twice a day (mixed in 20 mL of warm water)	
Sarak Vati (500 mg)	At 10 pm (bedtime)	2 tablets at night (administered with warm water)	
External ayurvedic therapeutic procedures (*Panchakarma therapies*)			
Intervention	**Timing**	**Dosage**	**Duration**
Sarvanga Snehana (Therapeutic oleation of the whole body) with *Bala oil*.	9:00 am-9:15 am (15 minutes)	Around 200 mL/day	40 days
Sarvanga Bashpa Swedana (Steam Fomentation) with *Dashamula Kwatha*.	9:15 am-9:20 am (5 minutes)	Quantity sufficient	
Hridaya Basti (Therapeutic Retention of oil over the cardiac region) with *Bala oil*.	9:20 am-9:40 am (20 minutes)	Around 80 mL/day	
Matra Basti (Enema with medicated oil) with *Bala oil* - Administered immediately after lunch.	1:30 pm	60 mL/day	15 days

[Table/Fig-3]: Medications administered.

Assessment parameters		Before treatment	After treatment
2D echocardiography reports	Left ventricular (LV) function	Severe LV systolic dysfunction	Mildly depressed LV systolic function
	Left Ventricular Ejection Fraction (LVEF)	30-35%	45-50%
New York Heart Association (NYHA) Classification [1]		Class III	Class II
Fatigue Severity Scale (FSS) [2]		56	28
Modified Fatigue Impact Scale (MFIS) [3]		64	25
Pitting Oedema Grade [4]		3	1

[Table/Fig-4]: Assessment of clinical parameters.

one month, *Hridyarnava Rasa* was withdrawn, while the remaining drugs were continued for another month.

In the next follow-up, the patient complained of weariness and bodily aches. He was given *Arjuna Ghanvati* (250 mg)- two tablets twice daily before meals, *Navayasa Lauha* (250 mg)- two tablets twice daily before meals, *Dashamularishta*- 20 mL mixed with 20 mL lukewarm water after meals and *Sarak Vati* (500 mg)- two tablets at bedtime. After one month, *Dashamularishta* was discontinued and the rest were continued for two more months.

In the last follow-up, the patient expressed significant relief from his primary concerns overall through Ayurvedic medications. While minor associated complaints were reported during each follow-up, these were managed appropriately and did not overshadow the patient's significant improvement in the primary symptoms. This highlights the effectiveness of the treatment regimen in providing holistic relief and improving the patient's well-being.

DISCUSSION

The management of heart failure characterised by reduced LVEF after a myocardial infarction is a complex clinical challenge that requires a diverse treatment approach. Ayurvedic medications and detoxification procedures can improve circulation and overall cardiovascular function, potentially leading to better management of heart failure symptoms.

Some previously published case reports on Ayurvedic management of various heart diseases, or *Hridroga*, include Valvular Heart Disease [5], Atrial Septal Defect (ASD)-Ventricular Septal Defect (VSD) with pulmonary hypertension [6], Monomorphic Ventricular Tachycardia [7], Congestive Cardiac Failure [8] and Heart Failure with Low Ejection Fraction [9].

Additionally, a study involving 52 Chronic Heart Failure patients was published, in which the patients were given Heart Failure Reversal Therapy (HFRT). This therapy included *Panchakarma* procedures such as *Snehana* (oleation), *Swedana* (heat therapy), *Hrudaydhara* (concoction dripping treatment) and *Basti* (medicated enema) administered twice daily for seven days. Throughout the therapy period and the subsequent 30 days, patients adhered to a lifestyle regimen and consumed *ARJ kadha* twice daily, a decoction containing *Terminalia arjuna, Acorus calamus* and *Boerhaavia diffusa*, produced by dynamic remedies. This resulted in significant improvements in aerobic capacity and ejection fraction over 90 days [10].

On the other hand, there is a case report that focuses on managing heart failure with low LVEF post-myocardial infarction in a patient with critical thrombotic disease in the left anterior descending artery, along with hypertension, who was advised that coronary revascularisation might be necessary.

Furthermore, it emphasises managing such a complex condition with simple and effective medications. The herbal decoction given to the patient was specifically formulated to address his medical condition and was prepared fresh at the time of administration using the Churna (powder) of the prescribed herbs. Additionally, the mode of action of the drugs is described to help comprehend their role in treating this illness.

Mode of Action of Internal Medications

• Herbal decoction medications:

Terminalia arjuna (Arjuna)- The stem bark of Arjuna is known to have a cardioprotective effect at the molecular level. Its bark extract has also shown a protective effect on the left ventricles and baroreflex sensitivity [11].

Withania somnifera (Ashwagandha)- Studies conducted on rats with induced cardiac ischaemia have shown that its administration dramatically lowers cardiac damage caused by ischaemia [12].

Terminalia chebula (Haritaki)- It promotes cardio protection by increasing high-density lipoprotein levels and lowering phospholipid and triglyceride levels. It also improves cardiac output and contractility without altering the heart rate [13].

Curcuma longa (Haridra)- According to animal studies, curcumin possesses cardiovascular protective properties, which include reducing cholesterol and triglycerides and helping to inhibit platelet aggregation [14].

Boerhavia diffusa (Punarnava)- It is known to induce diuresis, thus helping to reduce oedema. Furthermore, its polyphenol-rich ethanol extract has shown a noteworthy reduction in cardiac fibrosis and oxidative stress, which helps protect against cardiac abnormalities [15].

Thus, the decoction made from the herbs listed above works to strengthen the heart, improve cardiac output and alleviate symptoms of heart failure.

• Other internal ayurvedic medications:

Prabhakar Vati- It is an excellent drug that promises great results in various cardiac conditions. It is antianginal, cardioprotective and has been shown to slow down the progression of atherosclerosis [16].

Arjunarishta- It is an herbal fermentative formulation that has improved absorption and faster action. It helps strengthen the cardiac muscle and improve cardiac function by managing blood pressure and cholesterol levels [17].

Sarak Vati- It helps in the elimination of excreta, which leads to proper bowel evacuation [18].

Mode of Action of External Ayurvedic Therapeutic Procedures

Sarvanga Snehana (Therapeutic oleation of the whole body) with *Bala oil*- This is a therapeutic massage that involves coordinated strokes across the body. It improves physical strength and regulates circulation by opening channels throughout the body [19].

Sarvanga Bashpa Swedana (Steam Fomentation) with *Dashamula Kwatha*- This treatment helps to induce sweating and aids in the elimination of toxins. It can penetrate deep into the microcirculatory channels, resulting in vasodilation [20].

Hridaya Basti (Therapeutic Retention of oil over the cardiac region) with *Bala oil*- This procedure is applied to the chest and provides steady heat for a set period. It aids in aortic dilatation and maintains blood flow, thereby relieving chest pain and discomfort. It also relaxes the mind by stimulating the Vagus nerve [21].

Matra Basti (Enema with medicated oil) with *Bala oil*- This involves the anal administration of medicated oil for the elimination of toxins from the body [22]. It affects the entire body since it penetrates the general circulation.

CONCLUSION(S)

The present case report demonstrates the improvement in LVEF following a myocardial infarction. However, no reduction in clot size is observed. Additionally, the patient declined to undergo a coronary angiography or cardiac PET scan after treatment. As a result, further analogous studies must be conducted and documented on a broader population of such patients to better comprehend Ayurveda's potential for managing complex illnesses. Moreover, more research into preventive cardiology and integrative approaches to cardiovascular disease should be promoted to enhance the understanding of the role of Ayurveda in cardiology according to modern parameters.

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