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Case Report

Ayurvedic approach to treat *Hridroga* (valvular heart disease): A case report

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ABSTRACT

Kabhatika Hridroga (valvular heart disease) embodies a significant part of cardiovascular disease. There are many causes for valvular heart disease of which, the rheumatic fever is an important one. This study is a case report of a patient awaiting mitral valve transplant for valvular heart disease (i.e., mitral stenosis attributed to rheumatic fever), who responded well to Ayurvedic management. After 11 months of treatment, 3D cardiovascular cartography showed increase in mitral valve area from 1.3 sq cm to 3.52 sq cm (normal size is 4–6 sq cm). The present case report showed that Ayurveda has a great potential for the treatment of valvular heart disease and merits further research.

1. Introduction

The word '*Hrudaya*' in Ayurveda is a synonym for heart in Modern medicine. The name itself indicates the function of this vital organ. '*Hru*' means, one which draws fluid or blood from the body forcibly [1] and '*Da*' which means to donate. Simply saying, *Rasa* (body fluids) and *Rakta* (blood) are circulated in the body, by the dual action of forcible collection and supply by the heart and thus the name *Hrudaya* in Ayurveda. This is the fundamental function of the heart. According to Ayurvedic texts, the heart originates from the essence of *Rakta* and *Kapha*, predominantly from maternal side, and develops into a muscular organ [2] Movement of the heart is controlled by *Vyanavayu* and so is the case of valvular disorders. It can be assumed that the pericardium is developed from *Meda*, myocardium from *Mamasa* and endocardium from *Rasa* and *Rakta*. Retention of vitiated *rasa* and *rakta* circulated in the endocardium may gradually develop valvular inflammation which in due course turns to another state of infection and ultimately in state developing *Krimis*. If this state continues for a prolonged period, due to *mamsadusti,* valves become degenerate, and valvular disorders like stenosis and regurgitation occurs. Characteristic feature of valvular heart disease is the presence of murmur. Mostly this disease is rheumatic in origin. This may be considered as a synonym for *amavatha.* So the treatment aims fundamentally to correct the imbalanced *vata, rasa, rakta* and *mamsa*. No synonym is found in Ayurvedic texts for valvular heart disease. Yet, they can be successfully treated by Ayurvedic medicines. Hundreds of formulations are portrayed in Ayurvedic classics.

2. Presenting complaints and medical history

A 40 year old married lady consulted in an Ayurvedic clinic at Kottayam, Kerala on 31.05.2015 with cardinal symptoms of breathing problem, chest pain followed by fainting for few seconds, difficulty in climbing steps. Other complaints included mild *Bhrama* (vertigo) breathing problem, *Anaha* (bloating), *Agnimandya* (Loss of appetite), palpitation, tiredness, burning ankle joints, left elbow joint pain, mild pain in right calcaneal area, regular throat irritation and colds, sneezing and severe *klama* (fatigue). Patient was not responded to earlier treatment ie., with Ecosprin and Anti hypertensive medicines. Use of antihypertensive medicine resulted in severe BP fall, and when the medicine to correct BP fall was administered the BP will again shoot up. So they dropped antihypertensive medicine.

In 2012, diagnosis of valvular heart disease was made, based on clinical findings, cardiomegaly on X-ray (04.06.2012) and ECHO findings (31.07 2012), confirming Valvular Heart Disease. For a long time, the case was under the surveillance of a leading Cardiac

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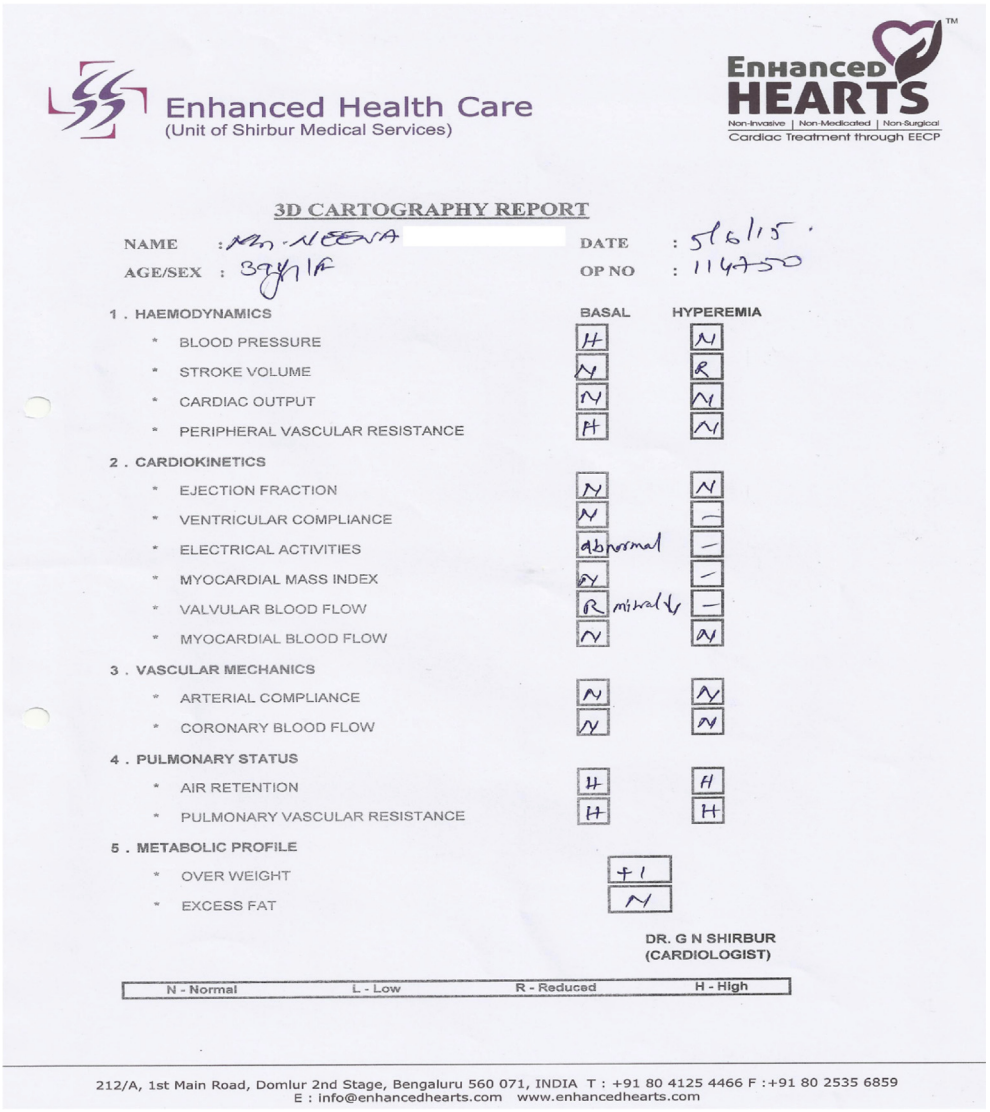
3DCCG Summary Report 1 (Before Treatment on 05.06.2015)



Enhanced Health Care
(Unit of Shirbur Medical Services)

EnHanced HEARTS
Non-Invasive | Non-Medicated | Non-Surgical
Cardiac Treatment through EECP

3D CARTOGRAPHY REPORT

NAME : Mrs. NEENA
AGE/SEX : 39Y/F
DATE : 5/6/15.
OP NO : 114750

	BASAL	HYPEREMIA
1. HAEMODYNAMICS		
* BLOOD PRESSURE	H	N
* STROKE VOLUME	N	R
* CARDIAC OUTPUT	N	N
* PERIPHERAL VASCULAR RESISTANCE	H	N
2. CARDIOKINETICS		
* EJECTION FRACTION	N	N
* VENTRICULAR COMPLIANCE	N	–
* ELECTRICAL ACTIVITIES	abnormal	–
* MYOCARDIAL MASS INDEX	N	–
* VALVULAR BLOOD FLOW	R mildly	–
* MYOCARDIAL BLOOD FLOW	N	N
3. VASCULAR MECHANICS		
* ARTERIAL COMPLIANCE	N	N
* CORONARY BLOOD FLOW	N	N
4. PULMONARY STATUS		
* AIR RETENTION	H	H
* PULMONARY VASCULAR RESISTANCE	H	H
5. METABOLIC PROFILE		
* OVER WEIGHT	+1	
* EXCESS FAT	N	

DR. G N SHIRBUR
(CARDIOLOGIST)

N - Normal L - Low R - Reduced H - High

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Fig. 1. 3-D Cardio before and after; echo before and after with patient identity masked – 3DCCG Summary Report 1 (Before Treatment on 05.06.2015).

Surgeon at Chennai, and waiting for a surgical transplantation of Mitral Valve. Her medical history is notable for Addison's disease, diagnosed in 1993 and treated with wysolone for twelve years. She stopped medicines for Addison's disease by 2005, after APA - IGG and APA -IGM become normal. She has a history of two abortions. There was no family history of valvular heart diseases.

3. Clinical findings

On examination she had multiple joints pain that was deep seated, Aortic Rub, right calcaneal pain, silent nasal polyps, mid inter phalangeal and distal inter phalangeal deformities and decolouration on that area was also seen. Abdomen was distended. Liver was mildly palpable.

ECHO done on 31.07.2012 (Fig. 4) showed: Aortic Valve Disease, Trileaflet Aortic Valve, Thickened Edges, Mild Grade II AR and Mild MR, Grade I Diastolic Dysfunction, Good LV Systolic Function.

ECHO done on 04.08.2016 (Fig. 8) showed thickened aortic valve, aortic regurgitation mild, mitral valve appears thickened with mild regurgitation normal chamber dimensions, no regional wall motion abnormality, normal LV systolic function and contraction.

On USG, hepatomegaly seen. AntiphospholipidA (APA) -Ig G was 48.4, APA-Ig M was 13.5, both found elevated during the episode of Addison's disease. Advised the patient to undergo a non-invasive test 3D Cardiovascular Cartography (Figs. 1–3). Test was done on 05.06.2015. Mitral Valve Orifice was reduced to 1.3 sq.cms (Normal above 4 sq.cms) Aortic Valve orifice was normal (4.35 sq.cms). Blood pressure was high (130/120), Systemic vascular resistance, Rate pressure product, Pulmonary vascular resistance etc., was high. In pulmonary dynamics air retention, pulmonary capillary resistance and pulmonary vascular resistance were found high. Fluid retention was marginal. ANS activity in reactive hyperaemia study was sympathetic. ANS Predominance is an excellent indicator of forced cardiac activity. Predominantly Sympathathetic subjects are prone to Cardiac anomalies including Cardiac Sudden Death Syndrome. Sympathetic activation has other important effects, which can be deleterious, including ventricular hypertrophy,

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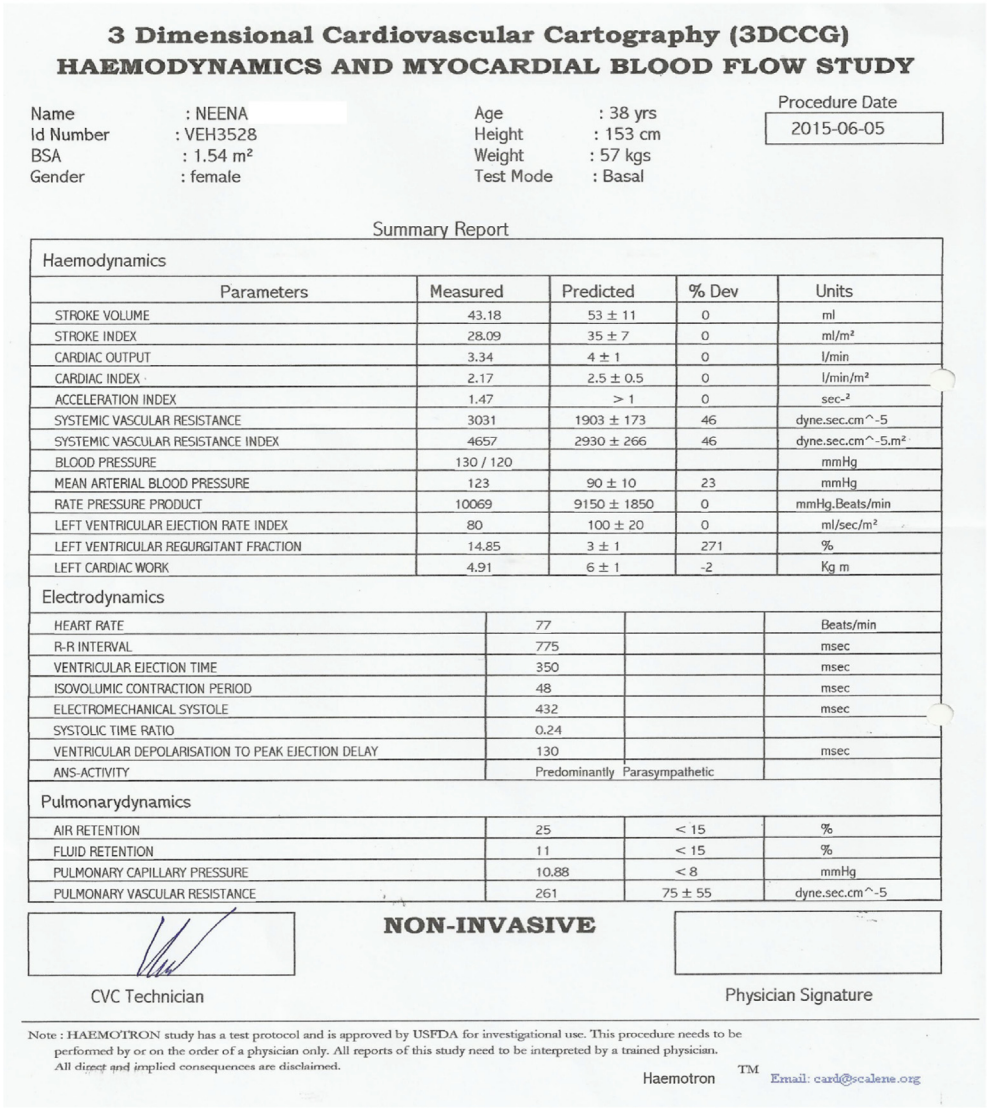
3DCCG Summary Report 2 (Before Treatment on 05.06.2015)



3 Dimensional Cardiovascular Cartography (3DCCG)
HAEMODYNAMICS AND MYOCARDIAL BLOOD FLOW STUDY

Name	: NEENA	Age	: 38 yrs	Procedure Date
Id Number	: VEH3528	Height	: 153 cm	2015-06-05
BSA	: 1.54 m²	Weight	: 57 kgs	
Gender	: female	Test Mode	: Basal	

Summary Report

Haemodynamics				
Parameters	Measured	Predicted	% Dev	Units
STROKE VOLUME	43.18	53 ± 11	0	ml
STROKE INDEX	28.09	35 ± 7	0	ml/m²
CARDIAC OUTPUT	3.34	4 ± 1	0	l/min
CARDIAC INDEX	2.17	2.5 ± 0.5	0	l/min/m²
ACCELERATION INDEX	1.47	> 1	0	sec-²
SYSTEMIC VASCULAR RESISTANCE	3031	1903 ± 173	46	dyne.sec.cm^-5
SYSTEMIC VASCULAR RESISTANCE INDEX	4657	2930 ± 266	46	dyne.sec.cm^-5.m²
BLOOD PRESSURE	130 / 120			mmHg
MEAN ARTERIAL BLOOD PRESSURE	123	90 ± 10	23	mmHg
RATE PRESSURE PRODUCT	10069	9150 ± 1850	0	mmHg.Beats/min
LEFT VENTRICULAR EJECTION RATE INDEX	80	100 ± 20	0	ml/sec/m²
LEFT VENTRICULAR REGURGITANT FRACTION	14.85	3 ± 1	271	%
LEFT CARDIAC WORK	4.91	6 ± 1	-2	Kg m

Electrodynamics			
HEART RATE	77		Beats/min
R-R INTERVAL	775		msec
VENTRICULAR EJECTION TIME	350		msec
ISOVOLUMIC CONTRACTION PERIOD	48		msec
ELECTROMECHANICAL SYSTOLE	432		msec
SYSTOLIC TIME RATIO	0.24		
VENTRICULAR DEPOLARISATION TO PEAK EJECTION DELAY	130		msec
ANS-ACTIVITY	Predominantly Parasympathetic		

Pulmonarydynamics			
AIR RETENTION	25	< 15	%
FLUID RETENTION	11	< 15	%
PULMONARY CAPILLARY PRESSURE	10.88	< 8	mmHg
PULMONARY VASCULAR RESISTANCE	261	75 ± 55	dyne.sec.cm^-5

NON-INVASIVE

CVC Technician

Physician Signature

Note : HAEMOTRON study has a test protocol and is approved by USFDA for investigational use. This procedure needs to be performed by or on the order of a physician only. All reports of this study need to be interpreted by a trained physician. All direct and implied consequences are disclaimed.

Haemotron TM Email: card@scalene.org

Fig. 2. 3-D Cardio before and after; echo before and after with patient identity masked – 3DCCG Summary Report 2 (Before Treatment on 05.06.2015).

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3DCCG Scan Dated 05.06.2015 (Before Treatment)

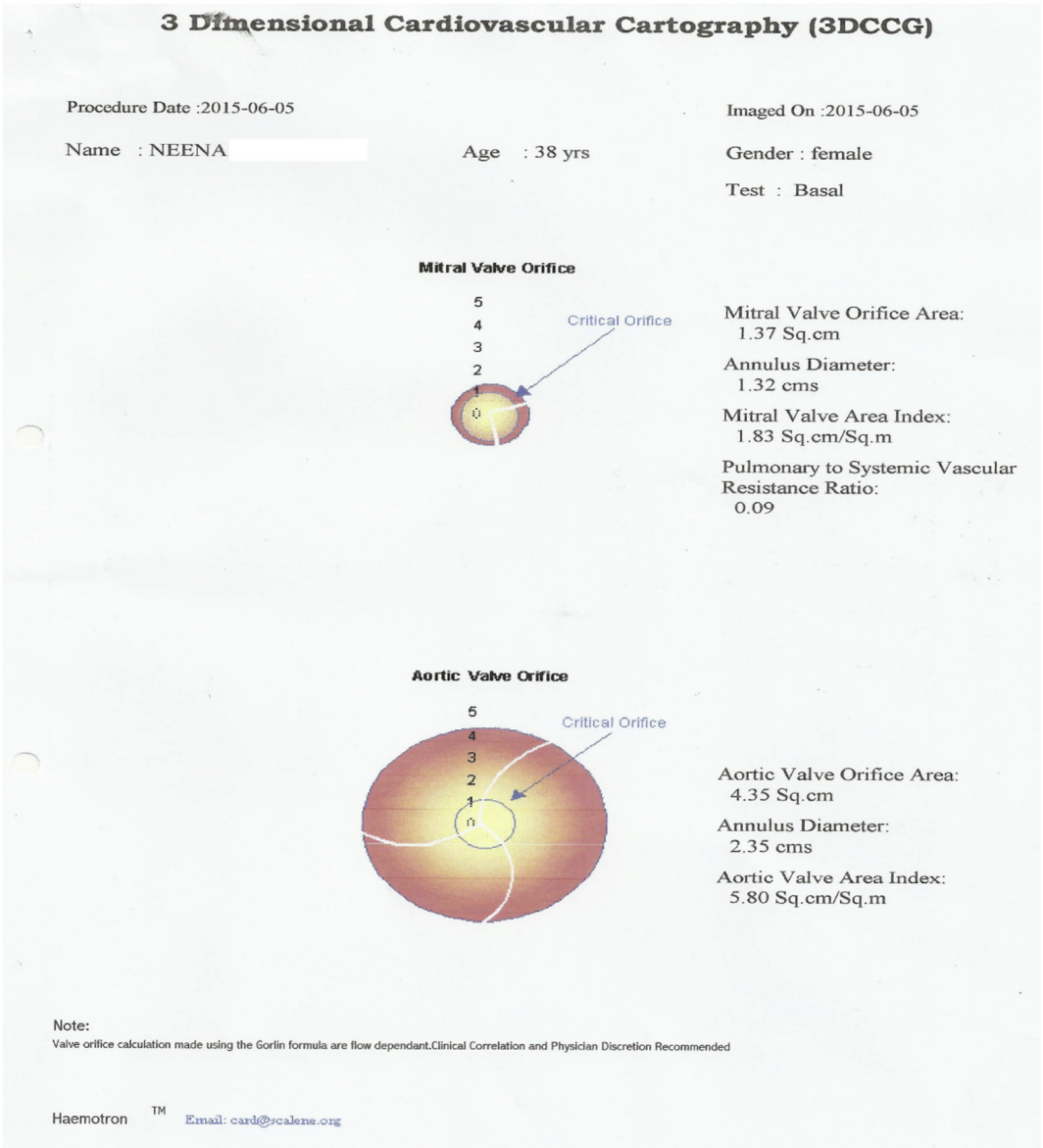
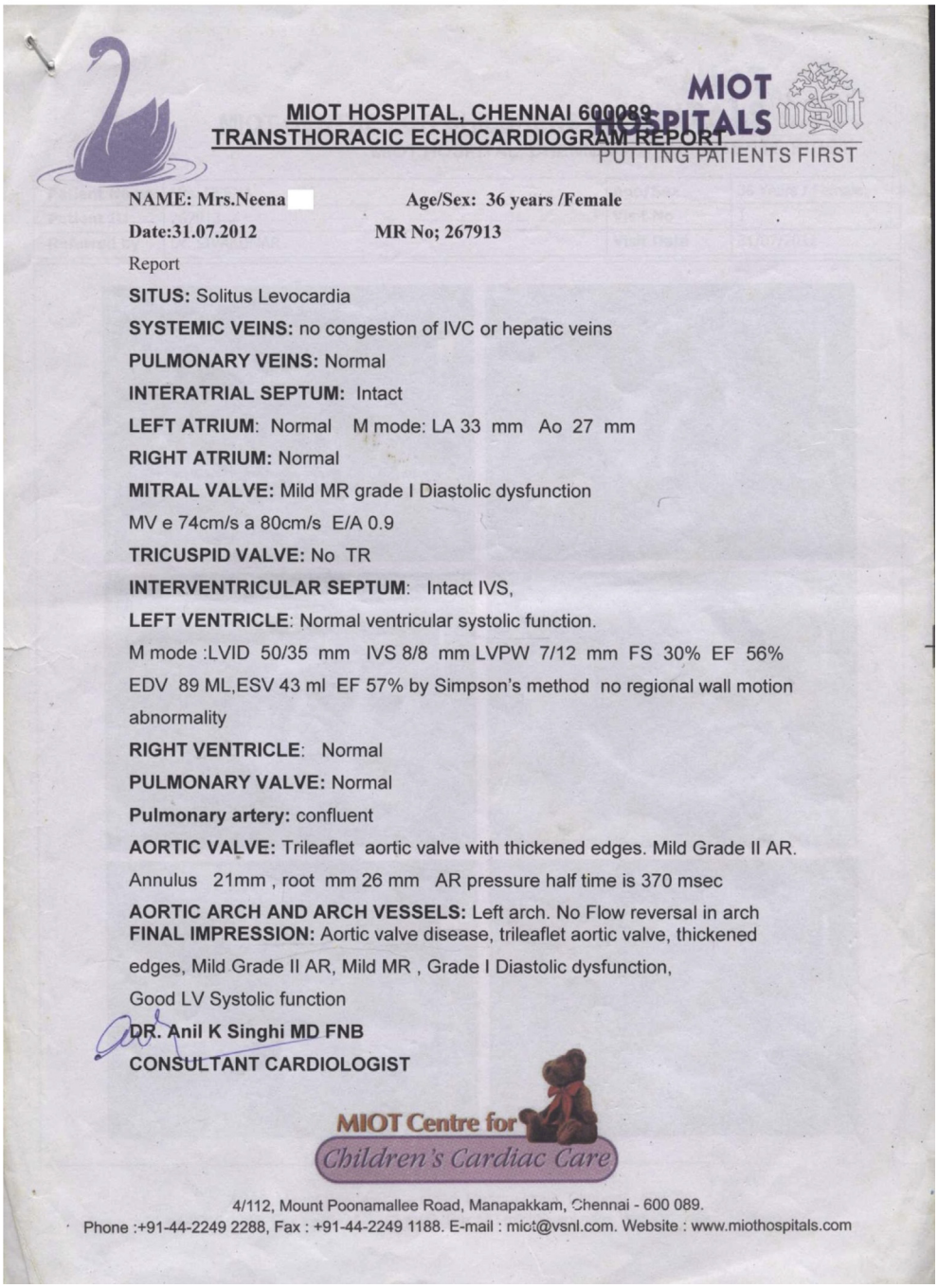


Fig. 3. 3-D Cardio before and after; echo before and after with patient identity masked – 3DCCG Scan Dated 05.06.2015 (Before Treatment).

Echo Test Dated 31.07.2012 (Before Treatment)



MIOT HOSPITALS
PUTTING PATIENTS FIRST

MIOT HOSPITAL, CHENNAI 600089
TRANSTHORACIC ECHOCARDIOGRAM REPORT

NAME: Mrs.Neena Age/Sex: 36 years /Female

Date:31.07.2012 MR No; 267913

Report

SITUS: Solitus Levocardia

SYSTEMIC VEINS: no congestion of IVC or hepatic veins

PULMONARY VEINS: Normal

INTERATRIAL SEPTUM: Intact

LEFT ATRIUM: Normal M mode: LA 33 mm Ao 27 mm

RIGHT ATRIUM: Normal

MITRAL VALVE: Mild MR grade I Diastolic dysfunction

MV e 74cm/s a 80cm/s E/A 0.9

TRICUSPID VALVE: No TR

INTERVENTRICULAR SEPTUM: Intact IVS,

LEFT VENTRICLE: Normal ventricular systolic function.

M mode :LVID 50/35 mm IVS 8/8 mm LVPW 7/12 mm FS 30% EF 56%

EDV 89 ML,ESV 43 ml EF 57% by Simpson's method no regional wall motion abnormality

RIGHT VENTRICLE: Normal

PULMONARY VALVE: Normal

Pulmonary artery: confluent

AORTIC VALVE: Trileaflet aortic valve with thickened edges. Mild Grade II AR.

Annulus 21mm , root mm 26 mm AR pressure half time is 370 msec

AORTIC ARCH AND ARCH VESSELS: Left arch. No Flow reversal in arch

FINAL IMPRESSION: Aortic valve disease, trileaflet aortic valve, thickened edges, Mild Grade II AR, Mild MR , Grade I Diastolic dysfunction, Good LV Systolic function

DR. Anil K Singhi MD FNB

CONSULTANT CARDIOLOGIST

MIOT Centre for Children's Cardiac Care

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Fig. 4. 3-D Cardio before and after; echo before and after with patient identity masked – Echo Test Dated 31.07.2012 (Before Treatment).

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enhanced arrhythmogenesis and molecular, and biochemical changes that lead to further dysfunction over time. It actually exacerbates heart failure. Total arterial compliance was impaired in basal study. It is very difficult to have a comparison, because Valvular heart disease as such has no place in Ayurveda. In such cases the only tool available for Ayurvedic diagnosis is the *lakshana samuchaya* and conceptual interpretation of clinical features and investigative findings in terms of *doshadushyaadhishtan* involved in the diseased state in a patient. However, this can be stated as a *tridoshaj* disorder, where *dushya* is *mamasa*, *marma* and *adhishtan* is *hrudaya*. This condition can be placed as a complication of *amavat*. According to Ayurveda, presence of *Hrudayavidradhi* for a prolonged period, without getting a specific treatment, may lead to the *shosham* or *vaikalyam* of valves.

4. Diagnostic focus and assessment

To assess the actual condition of the patient, three main investigations are done. One is 3D Cardiovascular Cartography test images. By this non-invasive test we can critically analyse for an early detection of Coronary Heart Disease. It measures the reduction of blood flow to the various regions of the heart. If there is a significant reduction of the blood flow, it is suggestive of the presence of obstruction (blockage) in blood vessel, which is decreasing the blood flow. It also provides an assessment of the functional status of heart, including how stiff the blood vessels are, the likelihood of clot formation, pumping capacity of

Table 2
Laboratory tests.

Test Name	Result Date	Result Date	Result Date	Result Date
	05.06.2015	22.10.2015	02.01.2016	24.03.2016
Hb%	12	12.2	11.5	11.6
TC	9800	9200	8800	9400
Poly	65	60	60	62
Lymph	30	37	36	34
Esnophils	5	3%	4	4
Monocytes	Nil	Nil	Nil	Nil
ESR	48	35	35	37
ANA	9.82	9.27	3.59	3.95
Anti Ds DNA	3.25	3.65	3.02	14.12
ASO Titer	154.85	132.05	142.31	143.28
CRP	3.53	1.99	3.14	1.62
S.Calcium	9.1	9.4	8.6	8.4
S.Uric Acid	7.6	7.3	5.6	5.6
RA	9.4	9.45	9.1	9.52
Hs CRP	0.925	0.248	0.39	0.625
RBS	89	82	86	85
S.Bilirubin	0.9	0.8	0.8	0.6
Direct	0.4	0.4	0.4	0.5
Indirect	0.4	0.4	0.4	0.4
SGOT	39	35	39	23
SGPT	48	43	31	28
BUN	15	14	14	15.4
S.Creatinine	1.2	1.01	1.14	1.22
Ratio B/C	13.8:1	13.05:1	12.2:1	11.1:1
AFP				4.4

Table 1
Timeline of events.

Sl. No	Date of Consultation	Symptoms	Clinical findings	Laboratory findings	Treatment given
1	07.06.2015	Breathing problem, Chest pain and fainting, Recurrent episodes of throat pain and cold. Difficulty in climbing steps	Multiple joints pain, Calcaneal pain, Mild deformities, Ayortic rub, Mild bhrama, body pain, fatigue	As in lab chart	Dasamoola Punarnavadi and Thrayanthyadikwath,Caps. Sing nada Gulgulu, Tab.Hridayarnavras, Caps.Heartin,AswagandharjunRas,HridayaSudha, Tab.Cardinox, Tab.Cosliv,Tab.SankaraBati, HeerakBhasmam, PunarnavaBaladiKsheeraPakam, GandharvaHastadiErnadam, BrihatSaindhavadiTailam, Dhavalalepam
2	22.10.2015	Feels better for above symptoms	Palpitation, Distension	As in lab chart	PunarnavaAbhayadi and Thrayanthyadi, Tab.ChintamoniRas (Instead of Tab.Sankarabati) Other medicines continued.
3.	31.12.2015	Body oedema mild, fatigue	Mild oedema seen on joints	As in lab chart	DasamoolaPunarnavadi and RasnaDasamoolam, Caps.Heartin, Caps Bonton, AswagandharjunRas, Caps.Heartin, Caps Bonton, AswagandharjunRas, Dasamoolarishtam,Tab.Cardinox,TabHepano, DashamoolaHareetaki,Caps.Obesil,Tab.SankaraBati, PunarnavaBaladiKsheeraPakam, Kethakeemooladi+ KarpooradiTailam, HeerakBhasmam, DhanwantharamTailam (Pichu), GandharvaHastadiErandam
4.	24.03.2016	Body itching, sramam, Klamam	Oedema subsided, liver palpable	As in Lab Chart	Dasmoola, Punarnavadi, Thrayanthyadi, Caps.Heartin,Caps.Liv Plus, Tab.Cardinox,TabHepano, Brahma Rasayan,Tab.Vidaryadi, Tab.Sidhamakaradwajam, PunarnavaBaldiKsheerapakam, HeerakBhasmam, DhanwantharamTaila (pichu), NakulaTailam (instead of Gandharvahastadierandam), HareedraKhandam
5.	10.05.2016	Itching decreased, Total health Better, Mild Aruchi, No breathing problem, No Chest pain, No fainting, No throat pain, No Cold. Climbing steps withoutdifficulty.	Sramam mildly better, periods time pain, Mild loss of appetite	Advised for 3D CCG, followup	DasamolaPunarnavadi and PadhyaPunarnavadi, Tab.Sankarabati (instead of Tab.Sidhamakaradwajam) HareedraKhandam stopped, PanchakolaChoornam (forpreparing Kanji).ArjunaKsheerapakam (instead of PunarnavaBaladi). NimbathwagadiKwath one doze daily with Tab.Arogyavardhini Other medicines continued

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the heart, size of the mitral valve, global cardiac efficiency and aortic valve orifice etc. This produces a complete cardiovascular physiological profile of a patient consisting over 64 cardiovascular functional parameters that directly aid in perfect diagnosis. Secondly the echo tests. Thirdly laboratory investigations, as follows.

5. Therapeutic focus and assessment

In this case, Ayurvedic diagnosis and interpretation is, accounting modern diagnosis also. Heart disease is the well known complication of *amavatha*. Ayurvedic texts mention two complications of amavata ie., *Hrudayavishudhi* (unclean state of heart) and *Hrudgraha* (impaired function of heart). In this case treatment is for *hrudgraha*, since Valvular heart disease is a complication of *amavata*. Basic principles of treatment applied here is as follows.

1. *Lamghana:* i.e., fasting or light diet, Restriction of diets as mentioned in Ayurvedic texts such as Characa.
2. *Virechana*: Mild purgation at regular intervals helps in getting rid of accumulated *ama* from the body.
3. *Deepan Pachan* medicines: Bitter pungent and *deepan-pachan* medicines which help digestion of *ama. Deepan* medicines act indirectly by stimulating digestive and tissue enzymes. While, *pachana* medicines help digestion by their direct action on food.
4. *Rasayana and Ojaskara Oushadhas*: After entire *ama* has been completely eradicated from the body as evidenced by feeling of body lightness, devoid of earlier presenting complaints, zeal, absence of joint swelling etc. *Rasayanojaskara* medicine are administered. In this case *Punarnava Baladi ksheerapaka* is given during the entire period of treatment, because of its *Deepan, pachan, shodhan, sophahara,* and *Srotho shodhana properties.* Besides, it is *pushtikrit and khayanashana.* Here we want the valves to be repaired by *pushtikrit* medicines. This will purify and rebuild the vitiated *Ras,Rakta, Mamsa and medas. Rasayana* and *pushtikrit -khayanashana* medicine can do this function effectively. Selection of medicines were, to serve the above purpose.
5. All the medicines except *Herrak Bhasmam* were given in usual dose. *Heerak Bhasmam* 100 mg was divided to 15 parts and one part with honey was advised in the morning after food and another doze in the night.
6. The patient was treated with *Kashayams* such as *Dashamoola Punarnavadi, Thryantyadi, Rasna Dasamoolam, Punarnava Abhayadi, Vidaryadi, Nimbathwagadi Kashayam, and Padhyapunarnavadi Kashyam, Arishtas such as Partharishtam, Dasamoolarishtam, Roheetakarishtam, tablets such as Tab.Cardinox, Caps.Heartin, Tab.Hepano, Tab.Hridayarnavras,Tab.Sankara Bati, Tab.Chintamoni Ras, Tab. Sidhamakaradhwajam, Dasamoolahareetaki, Brahma Rasyan, Heerak Bhasmam, Punarnava Baladi ksheerpakam, Arogyavardhini, Pacnchakolachoornam (Rice Kanji), Arjuna kheerapakam, Dhanwantharamtailam pichu on chest, Gandharva Hastadi Erandam or Nakulatailam* for mild purgation weekly twice. Symptom of hepatomegaly may be the result of prolonged use of steroids. Special instructions were given to calm the mind by breathing exercise and meditation. The details of treatment are given in Tables 1 and 2.

6. Follow up and outcomes

Follow up has done regularly. After five months treatment patient felt good health and devoid of major complaints. Treatment continued for a further period of six months altering few medicines according to presenting sysmptoms.(see the time line chart). On 13.05.16 a follow up 3D Cardio Vascular Cartography test was done. It was found that the Mitral valve orifice rebuild to 3.52 Sq.cms from 1.37 Sq.cms. Total arterial compliance becomes normal. Refer the 3DCCG Summary (Figs. 1–4), before treatment and the 3DCCG Summary (Figs. 5–8), after treatment to assess the improvement.

7. Discussion

In Ayurvedic texts, two complications of *Amavata* are explained, one is *Hridayavishuddhi* and another is *Hridgraha* (Cardiology in Ayurveda by Dr.V.B.Athavale). *Hridayvishudhi* may be considered as the unclean state of the heart and *Hridgraha* as the impaired condition. Due to regular and prolonged accumulation of the *Ama* in the heart, the proper function of the heart may get impaired. Accumulation of *ama* in the endocardium gives rise to valvular heart disease [1] . In *amajwara*, *Hridyavishuddhi* is one of the symptoms. In charaka samhita there are so many clinical features of *hridroga*, which may correspond symptoms of valvular heart disease. *Vaivarnya*, *Kasa, Swasa, Murcha, Ruja* and *Jwara* are mentioned in charakasamhita. *Swasa* (dyspnoea) and *tamakaswasa* are differentiated. In which *Tamakaswasa* is a sign of *Hridayavishuddhi* and whose cardinal symptom is-'*Asine labhatesaukhyam*' [2]. So, *swasa* may be correlated to *Hridgraha*, an advanced impaired sate of heart. In this case, valvular heart disease is included in *Hridgraha* category. Medicines selected are mainly having *Deepana-Pachana-Hridya* properties. Another aim was to rebuild or correct the degenerated valves to its original texture by administering *pushtikrit* or *kshayanashanam* medicines. Before and after treatment, special care was given to apply techniques and methods of modern science to test and validate the results. Most of the modern doctors didn't accept the 3D cardiovascular test, so an echo test was also done for the acceptance of modern fraternity and to establish the efficacy of the age old indigenous System, Ayurveda.

8. Conclusion

This case emphasises, the need of the era to develop Ayurvedic Cardiology Management widely. In such cases surgical intervention is the only remedy in modern medicine. While, in Ayurveda so many drugs are available to treat different conditions of heart disorders, which are helpful in preventing, treating, relieving the symptoms and take care of the valves from further damage. By intensive practical study we can sort it out. In this case no *Panchakarma Therapy* was advised due to the patient's job related inconvenience. Surely, *Panchakarma* will fortify the effect of the normal treatment and we can minimize the period of medication to a certain extent.

8.1. Patient viewpoint

The patient was highly satisfied with the line of treatment. She has no chest pain and associated symptoms now. No fatigue. She is doing routine work effortlessly. Recently, she climbed a hilly area without any discomfort. The quality of personal and official life of the patient has improved a lot. Instead of a blank future she has now developed confidence and total well being.

8.2. Patient consent

Written permission for publication of the case study had been obtained from the patient.

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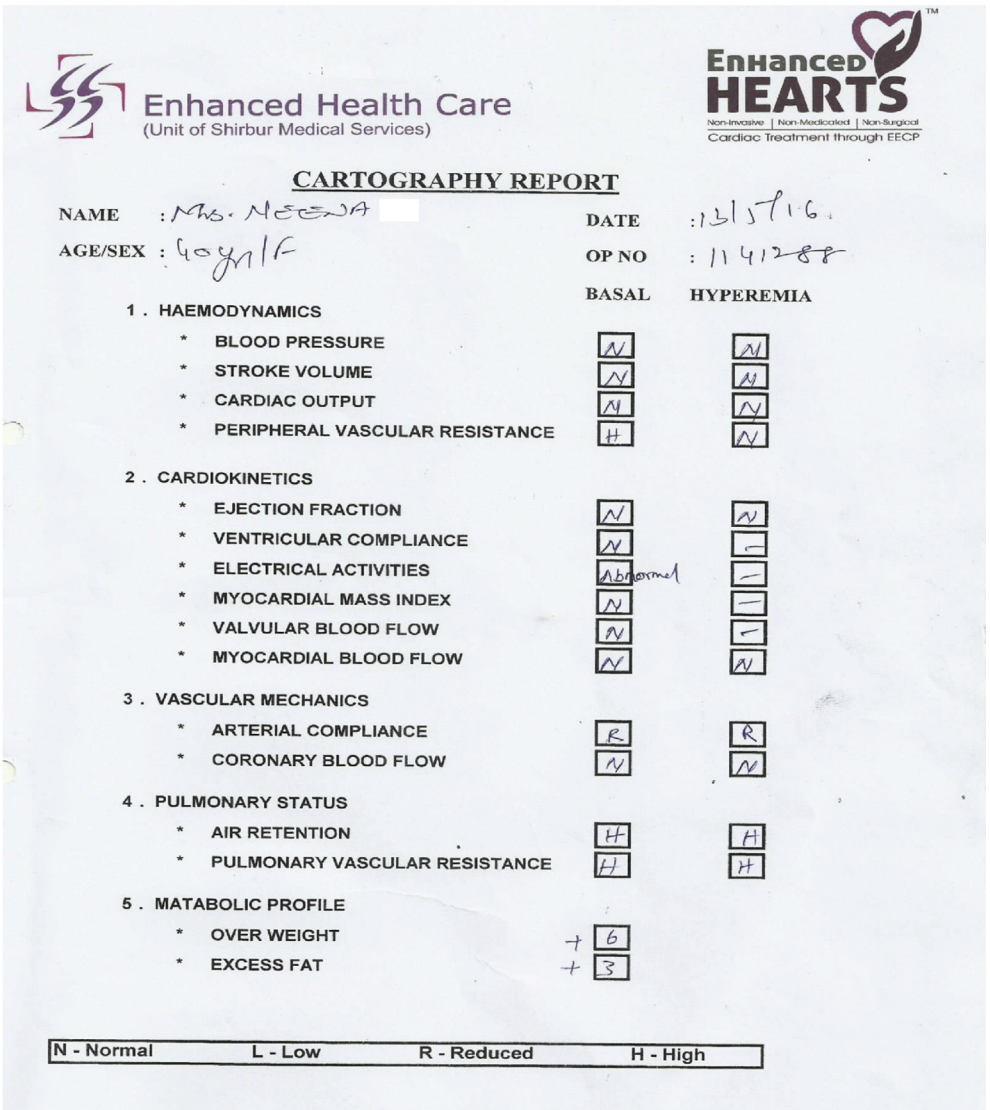
3DCCG Summary Report 1 (After Treatment on 13.05.2016)



Enhanced Health Care
(Unit of Shirbur Medical Services)

Enhanced HEARTS
Non-Invasive | Non-Medicated | Non-Surgical
Cardiac Treatment through EECP

CARTOGRAPHY REPORT

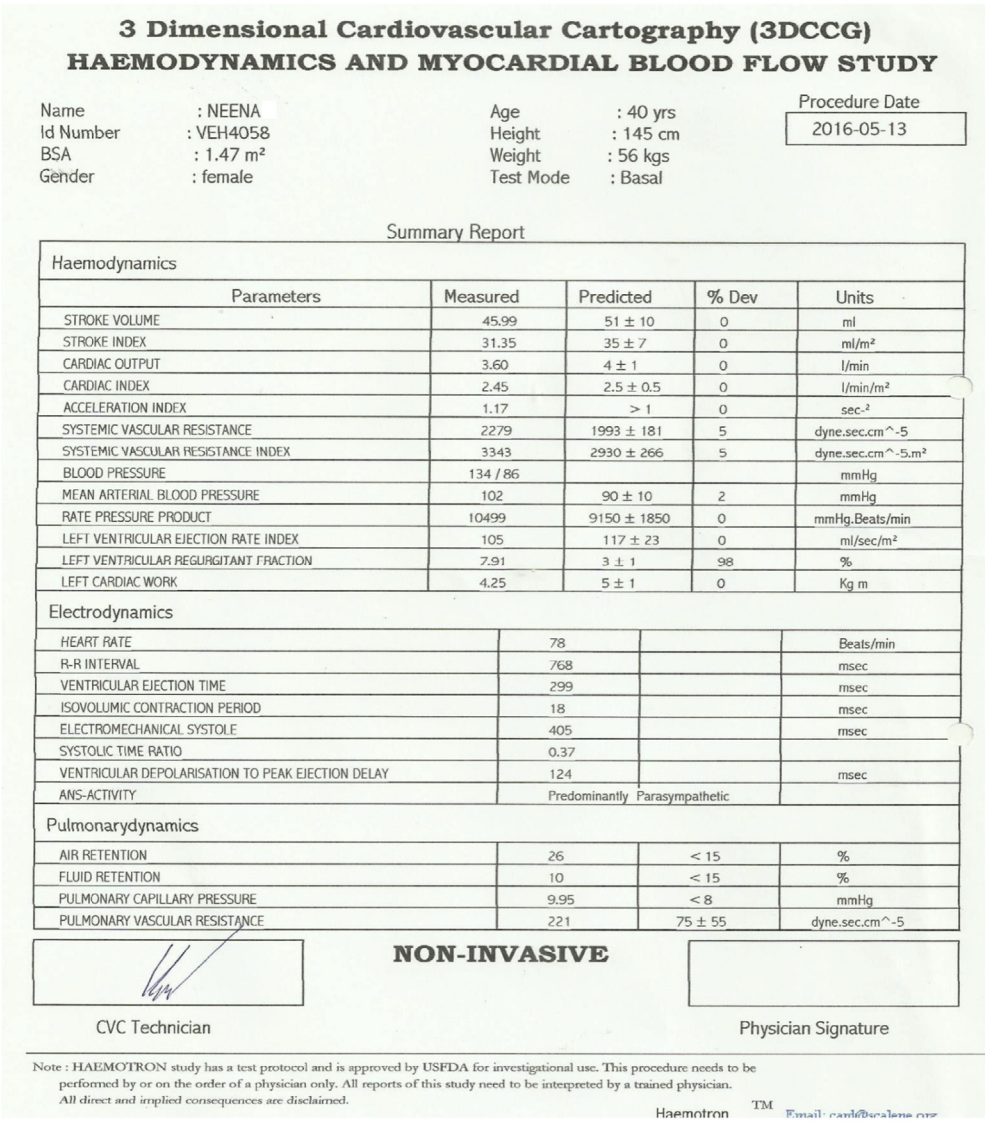
NAME : Mrs. MEENA
AGE/SEX : 40yrs/F
DATE : 13/5/16.
OP NO : 114288

	BASAL	HYPEREMIA
1. HAEMODYNAMICS		
* BLOOD PRESSURE	N	N
* STROKE VOLUME	N	N
* CARDIAC OUTPUT	N	N
* PERIPHERAL VASCULAR RESISTANCE	H	N
2. CARDIOKINETICS		
* EJECTION FRACTION	N	N
* VENTRICULAR COMPLIANCE	N	L
* ELECTRICAL ACTIVITIES	Abnormal	L
* MYOCARDIAL MASS INDEX	N	L
* VALVULAR BLOOD FLOW	N	L
* MYOCARDIAL BLOOD FLOW	N	N
3. VASCULAR MECHANICS		
* ARTERIAL COMPLIANCE	R	R
* CORONARY BLOOD FLOW	N	N
4. PULMONARY STATUS		
* AIR RETENTION	H	H
* PULMONARY VASCULAR RESISTANCE	H	H
5. MATABOLIC PROFILE		
* OVER WEIGHT	+ 6	
* EXCESS FAT	+ 3	

N - Normal L - Low R - Reduced H - High

Fig. 5. 3-D Cardio before and after; echo before and after with patient identity masked – 3DCCG Summary Report 1 (After Treatment on 13.05.2016).

3DCCG Summary Report 2 (After Treatment on 13.05.2016)



3 Dimensional Cardiovascular Cartography (3DCCG)
HAEMODYNAMICS AND MYOCARDIAL BLOOD FLOW STUDY

Name : NEENA
Id Number : VEH4058
BSA : 1.47 m²
Gender : female

Age : 40 yrs
Height : 145 cm
Weight : 56 kgs
Test Mode : Basal

Procedure Date
2016-05-13

Summary Report

Haemodynamics

Parameters	Measured	Predicted	% Dev	Units
STROKE VOLUME	45.99	51 ± 10	0	ml
STROKE INDEX	31.35	35 ± 7	0	ml/m²
CARDIAC OUTPUT	3.60	4 ± 1	0	l/min
CARDIAC INDEX	2.45	2.5 ± 0.5	0	l/min/m²
ACCELERATION INDEX	1.17	> 1	0	sec-²
SYSTEMIC VASCULAR RESISTANCE	2279	1993 ± 181	5	dyne.sec.cm^-5
SYSTEMIC VASCULAR RESISTANCE INDEX	3343	2930 ± 266	5	dyne.sec.cm^-5.m²
BLOOD PRESSURE	134 / 86			mmHg
MEAN ARTERIAL BLOOD PRESSURE	102	90 ± 10	2	mmHg
RATE PRESSURE PRODUCT	10499	9150 ± 1850	0	mmHg.Beats/min
LEFT VENTRICULAR EJECTION RATE INDEX	105	117 ± 23	0	ml/sec/m²
LEFT VENTRICULAR REGURGITANT FRACTION	7.91	3 ± 1	98	%
LEFT CARDIAC WORK	4.25	5 ± 1	0	Kg m

Electrodynamics

HEART RATE	78		Beats/min
R-R INTERVAL	768		msec
VENTRICULAR EJECTION TIME	299		msec
ISOVOLUMIC CONTRACTION PERIOD	18		msec
ELECTROMECHANICAL SYSTOLE	405		msec
SYSTOLIC TIME RATIO	0.37		
VENTRICULAR DEPOLARISATION TO PEAK EJECTION DELAY	124		msec
ANS-ACTIVITY	Predominantly Parasympathetic		

Pulmonarydynamics

AIR RETENTION	26	< 15	%
FLUID RETENTION	10	< 15	%
PULMONARY CAPILLARY PRESSURE	9.95	< 8	mmHg
PULMONARY VASCULAR RESISTANCE	221	75 ± 55	dyne.sec.cm^-5

NON-INVASIVE

CVC Technician

Physician Signature

Note : HAEMOTRON study has a test protocol and is approved by USFDA for investigational use. This procedure needs to be performed by or on the order of a physician only. All reports of this study need to be interpreted by a trained physician. All direct and implied consequences are disclaimed.

Haemotron TM

Fig. 6. 3-D Cardio before and after; echo before and after with patient identity masked – 3DCCG Summary Report 2 (After Treatment on 13.05.2016).

Please cite this article in press as: Mithra MP, Ayurvedic approach to treat *Hridroga* (valvular heart disease): A case report, J Ayurveda Integr Med (2018), https://doi.org/10.1016/j.jaim.2018.08.002

3DCCG Scan Dated 13.05.2016 (After Treatment)

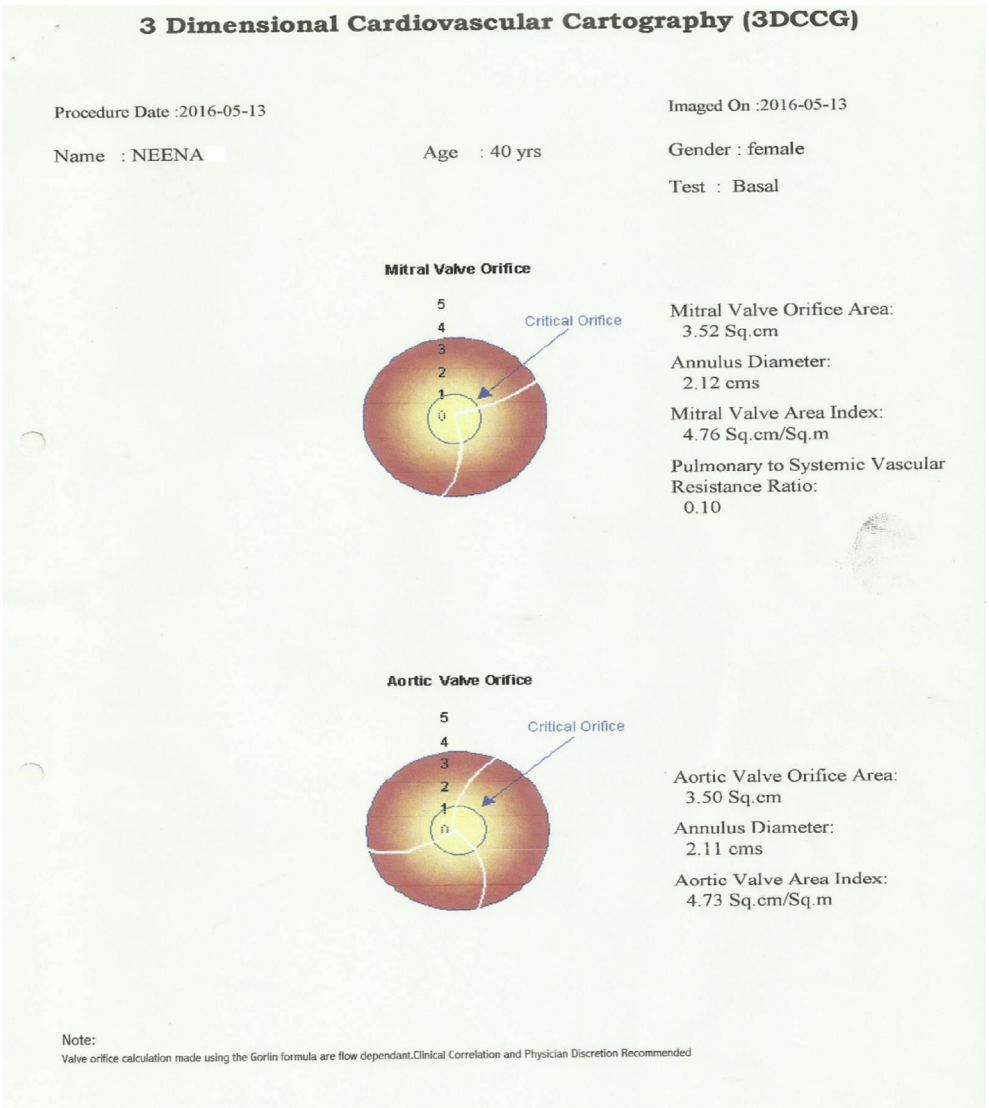
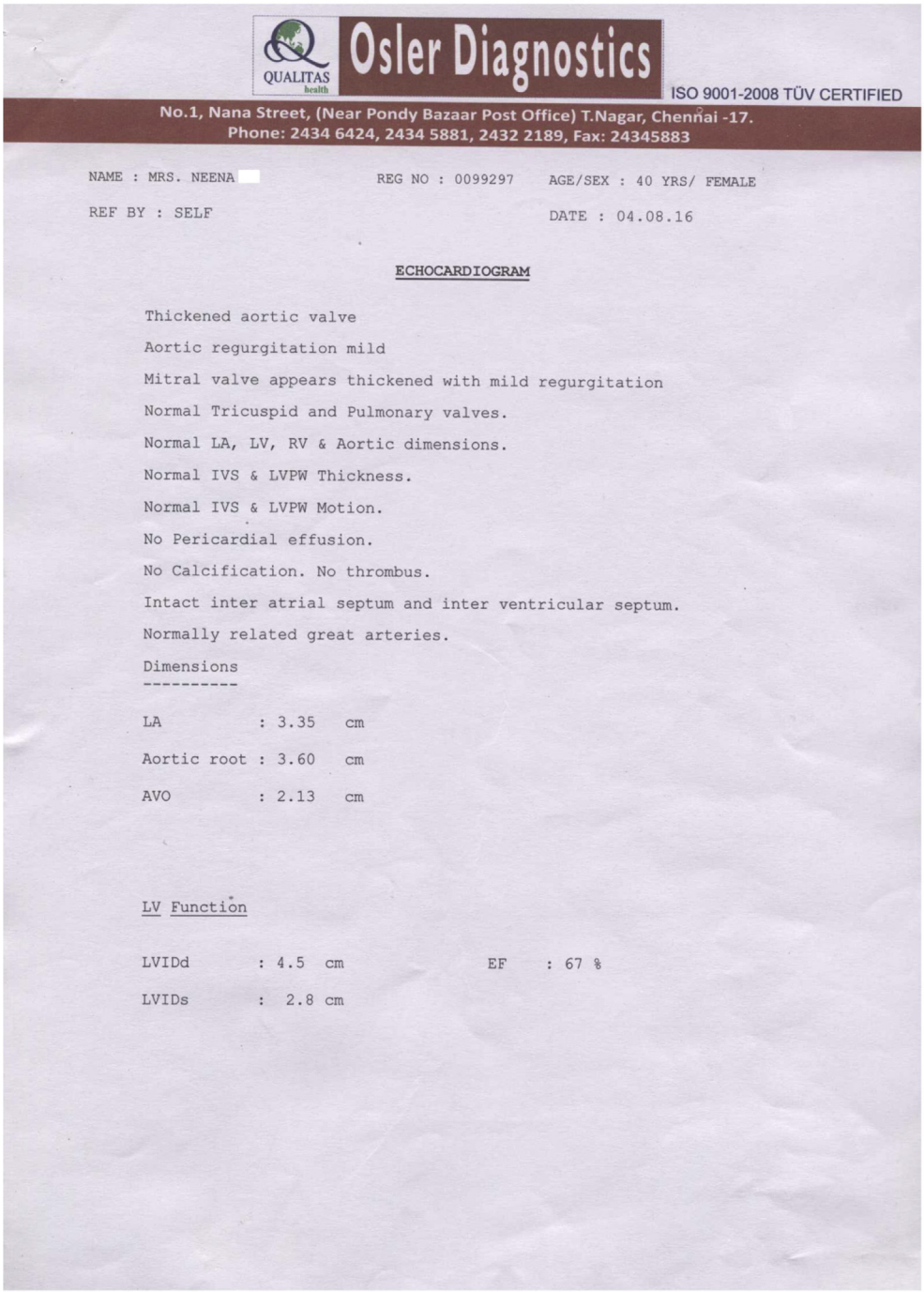


Fig. 7. 3-D Cardio before and after; echo before and after with patient identity masked – 3DCCG Scan Dated 13.05.2016 (After Treatment).

Please cite this article in press as: Mithra MP, Ayurvedic approach to treat *Hridroga* (valvular heart disease): A case report, J Ayurveda Integr Med (2018), https://doi.org/10.1016/j.jaim.2018.08.002

Echo Test Dated 04.08.2016 (After Treatment)



QUALITAS health

Osler Diagnostics

ISO 9001-2008 TÜV CERTIFIED

No.1, Nana Street, (Near Pondy Bazaar Post Office) T.Nagar, Chennai -17.
Phone: 2434 6424, 2434 5881, 2432 2189, Fax: 24345883

NAME : MRS. NEENA REG NO : 0099297 AGE/SEX : 40 YRS/ FEMALE

REF BY : SELF DATE : 04.08.16

ECHOCARDIOGRAM

Thickened aortic valve

Aortic regurgitation mild

Mitral valve appears thickened with mild regurgitation

Normal Tricuspid and Pulmonary valves.

Normal LA, LV, RV & Aortic dimensions.

Normal IVS & LVPW Thickness.

Normal IVS & LVPW Motion.

No Pericardial effusion.

No Calcification. No thrombus.

Intact inter atrial septum and inter ventricular septum.

Normally related great arteries.

Dimensions

LA : 3.35 cm

Aortic root : 3.60 cm

AVO : 2.13 cm

LV Function

LVIDd : 4.5 cm EF : 67 %

LVIDs : 2.8 cm

Fig. 8. 3-D Cardio before and after; echo before and after with patient identity masked – Echo Test Dated 04.08.2016 (After Treatment).

Sources of funding

None.

Conflicts of interest

None.

References

[1] Athavale VB. Cardiology in ayurveda. 1st ed. Chaukhamba Sanskrit Pratishthan; 1999.

[2] Sastry JLN, Nisteswar K. Ayurvedic management for heart diseases. 1st ed. Chaukhamba Sanskrit Pratishthan; 2014.

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