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History of Cardiology in India



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ABSTRACT

History as a science revolves around memories, travellers' tales, fables and chroniclers' stories, gossip and trans-telephonic conversations. Medicine itself as per the puritan's definition is a non-exact science because of the probability-predictability-sensitivity-specificity factors. Howsoever, the chronicles of Cardiology in India is quite interesting and intriguing. Heart and circulation was known to humankind from pre-Vedic era. Various therapeutics measures including the role of Yoga and transcendental meditation in curing cardiovascular diseases were known in India. Only recently there has been resurgence of the same globally. There have been very few innovations in Cardiology in India. The cause of this paucity possibly lie in the limited resources. This has a vicious effect on the research mentality of the population who are busy in meeting their daily requirements. This socio-scientific aspect needs a thorough study and is beyond the scope of the present documentation. Present is the future of past and so one must not forget the history which is essentially past that give the present generation the necessary fulcrum to stand in good stead. The present article essentially aims to pay tribute to all the workers and pioneers in the field of Cardiology in India, who in spite of limited resources ventured in an uncharted arena.

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'What is all knowledge except recorded experience, and a product of history?'

- Thomas Carlyle

1. Explanatory notes on science vs. history

Science as per Cartesian criterion constitutes rational method of analysing any problem, transforming rules logically, defining them in reproducible terms, inferring the rules and

then rigorous deduction of conclusion. How does history which as per Aristotle is an account of what individual human beings have done and suffered, fit into Science? Beneath the great continuities of thought, beneath the solid, homogenous manifestations of a collective mind which led to a linear development of science there persists a particular genre, form, discipline, or theoretical activity; non-linear interruptions whose status and nature vary considerably. It is these *epistemological acts and thresholds* which suspend the continuous accumulation of knowledge, interrupt its slow development, and force it to enter a new time, cut it off from its empirical origin and its original motivations, cleanse it of its imaginary complicities; The documentation of these

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interruptions connected linearly in a matrix of web in several planes and consciousness is called HISTORY.¹ Thus it is not surprising that science itself revolves around amalgamation of memories, travellers' tales, fables and chroniclers' stories, gossip, moral policing by the powerful and last but not the least the untiring human zeal. The old or modern history, both seeks the solid foundation of evidence provided by chains of researchers to establish the same as a scientific truth. Thus, history is indeed a science, but a science in some different sense, with its own methods and canons, no less exacting, perhaps than those of the sciences of nature, but resting on foundations different from them. Or maybe it is *sui generis*, neither science nor arts, but a sole independent faculty with altogether different mindset.²

The history in itself can be of three types; the contemporaneous writings limited to deeds, events and concepts which are witnessed by the very eyes or are in collective consciousness is called Original history; a history that reflects on events in past, written at some temporal distance from the events considered is Reflective history; and a history which does not concern merely with the events but searches the root cause for them is the Philosophical history. In this text we primarily deal with the Original history (but also a bit of Reflective and Philosophical history).³ History is a record of these defining moments.

2. Indian heritage of health and cardiovascular science

India has a heritage of knowledge dating back to 8000 BC.⁴ Extremely knowledgeable sages and saints perceived various aspects of nature and universe, experimented with their observations, concluded and transmitted their findings through the Vedas also known as 'Sruti' meaning hearing. They were never found in print form at that period. Out of the four Vedas Rik, Sham, Yadu and Atharva, the Rik and Atharva Vedas extensively covered health of human being. Only subsequently, in post Vedic era they got printed in the forms of various epics including treatise like Bhagvat Geeta.

Ayurveda is a combination of two components: 'Ayu' meaning life or age or longevity and 'Veda' meaning knowledge. This came into existence possibly in 5000 BC deriving concepts and rules laid down in the Rig Veda and Atharva Veda. Thus Ayurveda is the knowledge by which a healthy human life in all aspects-physical, mental, intellectual and spiritual lives and mainly concerned with the prolongation of a healthy life and prevention of diseases and senility and occasionally with the curing of diseases. World Health Organisation (WHO) has only recently adopted the same ethos for the definition of health.

Later around 600 BC, Susruta scientifically depicted the various aspects of human biology, anatomy, surgery with instrumentations in a book called 'Sushruta Sanhita', a great classic on the science of surgery which earned him the title of 'father of surgery' internationally. Similarly another stalwart physician Charaka possibly in the same era scripted the pharmacotherapy of various diseases in 'Charaka Sanhita' having 120 chapters with definite effort to move treatments to a reason-based approach.⁵

Yoga and transcendental meditation, a life style approach combined with dietary modification and 'Asanas' or specific corporal postures mostly adopted from 'Hathayoga', a gift from ancient India have contributed a lot in prevention of cardiovascular diseases. The renewed interest in the last & present century with evidence-based approach has been a boon to the people of the globe by circumventing the various pharmacological agents.⁶ Indian documentation of description of heart dates back to 600 BC in Charaka Sanhita and Sushruta Sanhita. Here, heart was described as the seat of consciousness and as a prime mover of 'prana' or imperious energy. Heart being the centre of the system, transmits energy through different 'nadis' or channels, which were later on described as 'siras' or veins, 'dhamanis' or arteries and 'srotas' or flow. Interestingly, Charak or Susruta did not have the clue that lungs had any role in the circulatory system. Instead, they described liver as the transmitter of purified blood coming to it through portal 'dhamani' or artery from intestine and through hepatic 'sira' or veins to the heart which then transmitted the same blood to all parts of body. It is presumed that they extensively studied fetal circulation possibly because greater availability of fetuses or new borns, where lungs are bypassed (for purified blood came to the fetus from mother through placenta and umbilical vein and this led to the overlooking of lungs altogether in the adult circulation). Sir B N Seal (1864–1938 AD), a philosopher and Mathematician par excellence from Bengal have extensively studied those aspects and put them in his treatise "The positive sciences of the ancient Hindus."^{7,8} Ancient Indians believed that life force 'prana' ('chi' for Chinese and 'ki' for Japanese) was located as the centre of consciousness in the heart. Further, the 'prana', is believed to be drawn into the body by the 'chakras' or wheels of life with whirling vortexes of energy. It was rather like whirlpool sucking in the energy and from that point it was distributed through the body, and, much like blood distribution it 'flows' through special 'channels'. The fourth (out of 7 Chakras) was the *Heart Chakra*, located near the centre of the chest, controlling the operation of the heart and the circulation of blood. Fig. 1.

3. Modern cardiology and cardiological society of India

Modern Cardiology became a reality as a superspeciality after the World War II. The advanced outlook and vision of a group of topmost Indian physicians under the leadership of Bharatratna Dr. Bidhan Chandra Roy led to official formation of the Cardiological Society of India (CSI) on 4th April, 1948, even before the formation of the American College of Cardiology in 1949 and many others.⁹ Formation of CSI was very interesting indeed. A group of eminent physicians including B C Roy, J C Banerjee and others were traveling in a train from Kolkata to Asansol, a sub-urban town to attend a conference in 1946 and on board; the idea of forming Bengal Cardiological Society was mooted and formed. Later on in 1948 the elite physicians of India met at Kolkata (The then Calcutta) and CSI came into being on 4th April, 1948. The All India Heart Foundation (AIHF), one of the first in Asia was formed in

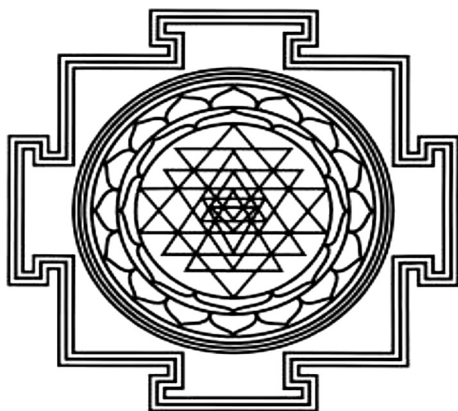


Fig. 1 – ‘Chakra’ or wheel of life.

1962. Both the societies got affiliated to World Heart Federation, which in its earlier incarnation- International Society of Cardiology in 1946.⁹ Later on CSI became the founder member of the Asian Pacific Society of Cardiology (APSC). In course of time, zeal and aspirations amongst many workers in different fields of Cardiology led to formation of many independent societies and organisations. Indian Academy of Echocardiography was founded in 1994, and almost at the same time, Indian College of Cardiology was also founded at Bengaluru by Dr. KS Shadaksharappa to promote exchange of views and experience among the specialities in the cardiovascular field. Similarly came the Indian Society of Electrocardiology, Indian Society of Pacing and Electrophysiology, Indian Society of Heart Failure, India Live, Indian Society of Hypertension, Paediatric Cardiac Society of India (PCSI), Indian Heart Rhythm Society etc.

CSI in its wisdom organised annual conferences at different cities in India along with API, tracked and formulated various measures for prevention and treatment of various diseases viz., rheumatic heart disease, a burning problem of early 60's and 70's, hypertension, a growing concern and other issues. Didactic lectures on clinical cases were the focus of attention to update the audience.

It is now the umbrella organisation of the Cardiologists of India with twenty seven affiliated chapters in the country as well as abroad. It has unique eight speciality council's viz., CSI-Cardiac Prevent for preventive cardiology, CSI-NIC for interventional cardiology, CSI-Heart Failure for heart failure, CSI-Imaging, CSI- RHD for rheumatic heart disease, CSI-Electrophysiology, CSI-Hypertension. There will be another council to take care of the medico-legal and ethical issues in Cardiology. Out of these, NIC-CSI is doing excellent job in organising world-class interventional cardiology conference in different cities right from 1998 till date. The first ever CSI-Cardio Prevent conference has already successfully taken place in 2014. The first ever CSI-Heart Failure conference-2015 is just knocking at the door.

The first annual conference of CSI was held in 1950 at Kolkata in association with All India Medical Conference and later in 1954, it was decided to hold the conference along with the Association of Physicians of India. From 1976 onwards separate CSI conference was held. During the first 30 years of existence of CSI, the most important event worth

mentioning was the 5th World Congress of Cardiology in 1966 at Delhi under the leadership of Dr. S Padmavati from Delhi and Dr. KK Datey from Mumbai with Dr. DP Basu from Kolkata as the President of CSI. The latter was strong advocate of the use of low molecular weight heparin in unstable angina.

Official journal of CSI, Indian Heart Journal started with a modest beginning at Kolkata in 1949 with Dr. JC Banerjee as the first Editor. The journal got a huge face-lift in content and quality under the editorship of Dr. Shantilal Shah from Mumbai who remained at the helm of the journal from 1971 to 1981 and later on Dr. VK Bahl from Delhi during 2000–2005. It is now a widely read peer-reviewed journal getting state-of-the-art articles contributed by specialists from across the globe. During 2012 to 2014, under the able editorship of Dr. K. Sarat Chandra, the journals got uploaded electronically in the official website of CSI, www.csi.org.in. The new look website of 2015 is now regularly hit by cardiologists and physicians to upgrade themselves. Dr. A K Banerjee, Dr. VK Bahl, Dr. PK Deb and Dr. K Venugopal were instrumental in starting a new epoch in CSI's international relationship, starting new partnerships with ACC and ESC.

4. Development of Cardiology in India

Government of India and state governments took initiatives in focusing on cardiovascular diseases. The first full-fledged Cardiology department came into existence at Vellore, Tamil Nadu, and in early 50's.

Near about the same time at Mumbai, Dr. Rustom Jal Vakil, a doyen in Modern Cardiology, while serving in Government institution of KEM hospital Bombay was able to identify a group of patients who were at high risk of developing acute MI at a time when the concept of acute coronary syndrome was at its infancy, when there was no echocardiography, or coronary angiogram, and no coronary care units either. He is also credited with the first publication of the role of Rauwolfia Serpentina from the extract of Rauwolfia in patients of hypertension. Two other innovators who were also involved separately with the utility of Rauwolfia alkaloid in hypertension almost at the same time were Dr. Gananath Sen and Dr. Kartick Chandra Bose.

The first-ever cardiac catheterisation laboratory for clinical studies was established in All India Institute of Medical Sciences (AIIMS), Delhi, India under the stewardship of Prof. Sujay Bijay Roy. He began his life at Myammar, the erstwhile Burma and with an extraordinary academic career he was teaching in the USA and from there he was brought to Delhi by Rajkumari Amrit Kaur, the then Health Minister of India to start the department of Cardiology. He Joined AIIMS in 1958: the rest became a remarkable landmark in the history of Cardiology in India. So far the modern Cardiology with hemodynamic-based concept in India is concerned, his name is mentioned synonymously. In clinical Cardiology, the term ‘Gospels of S B Roy’ is in vogue amongst the teachers and students pursuing Cardiology. He taught his students how to evaluate a patient haemodynamically at bed-side and this went like ‘Sruti’ or information passing from ear-to-ear. He was the person to highlight the devastating effect of

rheumatic heart disease on mitral valve in early period of life in India as compared to the late onset of disease in the western counter-part and labeled it as "Juvenile Mitral Stenosis."¹⁰ In his seminal paper, he acknowledged the published works of Dr. JC Banerjea (1935) and Dr. UP Basu (1925), both were Presidents of CSI at some point of time. He made his followers extraordinary students of Cardiology, who themselves became stalwarts in later life. The list of the names is endless: Drs ML Bhatia, M Khalliullah, R Tandon, I P Sukumar. Apart from them, there were other noted teachers in the other zones of India, who contributed a lot to the understanding and conceptualisation of Cardiology as a subject. In the West, Dr. K K Datey, Dr. R J Vakili; in the East Dr. R N Chatterjee, Dr. GC Gupta; in the South Dr. George Cherian and Dr. IP Sukumar were personalities in the early phase, who generated the genuine interest amongst the students by virtue of their witty teaching in Cardiology. All of them generated an army of teachers in Cardiology to carry the mantle forward. Simultaneously, there were impeccable personalities in the field of cardiovascular surgery, who contributed a lot in starting and carrying out complex cardiac surgeries in India with some innovations and also trained students to form a set of teachers in the subject. To name a few, they were Dr. A K Basu, Dr. P K Sen and later on Dr. Valiathan, Dr. Gopinath and Dr. J.P. Das from Odisha etc. The field of epidemiology and preventive cardiology in its modern form was practically invented by Prof KS Reddy.

5. Innovations in cardiology and first in India

In fact, there were really very few innovations from India in modern Cardiology, which are worth mentioning. The list is small: 1) Rauwolfia serpentina (Reserpin), an alkaloid from the extract of rauwolfia was the first anti-hypertensive Drug from India. 2) Sree Chitra Valves for cheap valve replacement, 3) Indigenous Khalilullah-Mendez temporary pacemaker, 4) Kalam-Raju Stent for percutaneous coronary intervention, 5) Chiral Molecules with less side effects, 6) Re-defining Yoga and Meditation in modern cardiology, as a therapeutic option for atherosclerotic coronary artery disease based on evidence.

However there were many firsts that happened in different Institutes in India and this contributed a lot to generate interest about Cardiology amongst doctors and people.

Dr. Reeve Betz started the first cardiothoracic surgery department at Vellore in 1949. Dr. T. Thomas and Dr. Gopinath joined Dr. Betz subsequently and initiated the first open heart surgery programs in 1960.

First ever electrocardiography (ECG) machine was used in K.E.M. Hospital, Mumbai in the late 40's. Two such mammoth size ECG machines are still available as antique specimen-one still lying in the residence of Dr. P.N. Brahmachari, Past President of CSI and son of legendary Sir U.N. Brahmachari and another at RG Kar Medical College, Kolkata. Fig. 2.

First Coronary Artery Bypass Graft (CABG) surgery was carried out by Dr. K.M. Cherian in 1975 at Chennai. First ever heterologous cardiac transplant with pig's heart was done at K.E.M. Hospital, Mumbai by Dr. PK Sen. The patient survived for twenty four hours only. He is also credited to have done the first

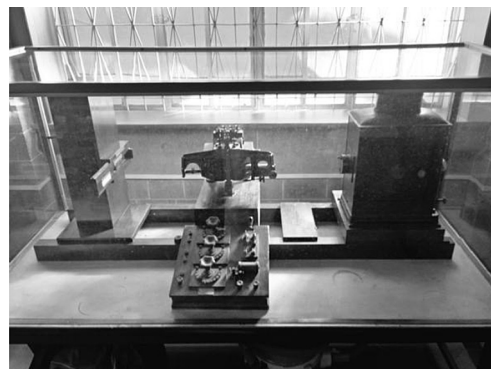


Fig. 2 – One of the early ECG machines in India (Source: Internet).

ever trans-myocardial revascularisation (TMR) with needle, a process known as reptilisation of heart. Prof P Venugopal at AIIMS, New Delhi, with support from Prof KK Talwar and Prof Balram Airan commenced cardiac transplantation in India in 1994 and then Dr. KM Cherian who carried out the first heart and lung transplant in India in 1999 also performed the maiden laser-guided TMR.¹¹ Since then, cardiac transplantation has been performed in 14 centres of the country and most of those centres performed only one or two cardiac transplants before uniformly poor results forced program foreclosures. Only a few centres now, AIIMS (New Delhi) and Frontier Hospital (Chennai) most notably, continue to hold the beacon of hope for the over 8000 patient's per annum in India who potentially require a heart transplant.

The first electrophysiology lab was established in 5th March, 1975 at G.B. Pant Hospital, Delhi by Dr. M Khalilullah and almost at same time interventional cardiac catheterisation labs were founded in Andhra Pradesh in 1977.

The onset of the pharmacological intervention of acute myocardial infarction started way back in 1984. Dr. KL Chopra, Dr. HK Chopra and others used streptokinase as a thrombolytic agent for the first time in India. The use of thrombolytic therapy created a lot of flutter in the medical fraternity those days.¹²

The history of first percutaneous transluminal coronary angioplasty (PTCA) is interesting. Many workers claimed their works as the first. However as per the record, the first ever PTCA was done in 1984 on right coronary artery (RCA) of a post-MI patient with DJ balloon with J-tipped wire by Prof. SC Manchanda at AIIMS, New Delhi. In the same year, Dr. M Khalilullah performed PTCA on left anterior descending artery (LAD) at G.B. Pant hospital, New Delhi. Creditably, few more PTCAs were carried out in the mid eighties by Dr. DB Pahalajani and Dr. Samuel Mathew at Mumbai and Dr. Somaraju at Nizam Institute of Medical Sciences (NIMS). Dr. Raju was also associated with the development of first indigenous coronary stent- Kalam-Raju Stent named after the innovators Dr. APJ Abdul Kalam, former chief of DR. DO and President of India and Dr. Soma Raju himself. Later on, works were further taken forward in different cities of India by Dr. A B Mehta, Dr. U Kaul & team, Dr. Asok Seth, Dr. M Panja & team, Dr. Haridas & team. Dr. DS Gambhir was the first person to perform left main angioplasty in India and he shared this experience in National

Intervention Council Meeting in 1996. While the coronary interventions are always applauded, the peripheral interventions which are quite challenging get muted response. Dr. Sanjay Tyagi, G.B. Pant Hospital has been a devoted peripheral interventionalist over the years and a leading name in this field. These pioneers have not only been responsible for propagation of the procedure across the country, many of them have taught the procedures in different African & Gulf countries. Coronary artery bypass graft surgery (CABG) was first performed in India in 1975 about 13 years after its advent in 1962. By mid 1990, some 10,100 CABG surgeries were being performed annually in India. Presently, the annual number is about 60,000 according to industry sources.

Dr. Tejas Patel has achieved global fame for popularising the trans-radial approach for diagnostic and therapeutic interventions. Thereafter, many operators from India adopted the procedure and are performing trans-radial interventions on regular basis.

Cardiac pacing in India dates back to late 1960s. First cardiac pacing in India was reported by the team of Dr. CC Kar and Dr. AK Basu from Institute of Post-graduate Medical Education and Research (IPGME&R), Calcutta in 1966-67.^{13,14} Dr. ML Bhatia started pacemaker implantation at AIIMS, New Delhi in 1968. Their first patient was a doctor from Assam and the pulse generator was supplied by Medtronic Inc. The pulse generator was powered by a mercury-iodide battery which lasted for about 2 ½ years, after which the patient underwent pulse generator replacement. Unfortunately he succumbed to military tuberculosis about a year after that. Currently around 8000 pacemakers are being implanted annually in India, in various centres around the country. The IPGME&R, Kolkata is the centre which implants maximum number of pacemakers in the country. Various hypotheses were put forward to explain the high incidence of conduction system disorders in the Eastern part of the country. The first ever causal-effect hypothesis was propounded on the relationship between heart block and diet with a view to prevention of the problem in India. Mustard oil, the cooking medium in the Eastern part of the country with high Erucic acid content of around 48% was implicated. However, study conducted on cooking medium by the Indian Council of Medical Research showed high Erucic acid content in all the 50 heart samples obtained from Calcutta (Eastern part of India) while none of the samples in the patients from Trivandrum or Madras (South India) who used coconut oil as cooking medium, showed any trace of Erucic acid.¹⁵ Erucic acid however was shown to produce myocardial fibrosis and lipidosis, but it was inferred that more studies were needed to conclusively prove whether Mustard oil is the etiological factor in the high incidence of heart block in the Eastern regions of India.¹⁶ The concept of pan-conduction defect was propagated by a team of workers from North-Eastern part of India comprising Dr. AK Barooah, Dr. MK Das and others and the works got presented in CSI annual conference -1985 at Guwahati, Assam.¹⁷

The first ever temporary pacemaker manufactured in India was the Khalilullah-Mendez pacemaker, which was marketed in 1970. It was a single chamber fixed rate pacemaker with facility for adjustment of pacing rate and pacing current.

Khalilullah-Mendez team also manufactured an indigenous monitor-defibrillator.

The first permanent pacemaker manufactured in India was from Shree Pacetronix Ltd. However, most of the components were imported. The pulse generator being very cheap was real boon for the common people of India. The model Ventralith-I which was a non-programmable VVI pacemaker is very noteworthy in this regard. First implant was on September 9th, 1994 at Kasturba Hospital, Bhopal. Subsequently Shree Pacetronix has started manufacturing multi-programmable pacemakers as well.¹⁸ The first multi-programmable pacemaker of Shree Pacetronix was implemented on June 6th, 1995 at Ramakrishna Mission Seva Pratishthan, Kolkata.

Invasive Cardiac Electrophysiology was initiated in the country in GB Pant Hospital and AIIMS. ML Bhatia et al and M Khalilulla et al were the pioneers in His bundle electrography in the country. Dr. KK Sethi was the first to perform catheter ablation in the country. Direct Current ablation was started in 1988 followed by Radio Frequency (RF) ablation. The number of centres having electrophysiology setup in the country has increased from about 10 in 1997 to around 30 in 2001 and is increasing day by day. The number of RF ablations being performed in the country has gone up from 800 to 2000 during the same period. The first ever Implantable Cardioverter Defibrillator (ICD) was implanted in India by Dr. TS Kler, Escorts Heart Institute & Research Centre, New Delhi and Dr. K.K. Talwar, AIIMS, New Delhi in 1995.¹⁸ Recently, Prof. VK Bahl became the first person to implant leadless pacemaker.

According to Dr. Raj Tandon, first Indian doctor who completed training in Paediatric Cardiology was Dr. S Padmawati. Both of them have received life-time achievement awards from Cardiologists Society of India. Dr. Padmawati spent a year with Dr. Helen Taussig and settled in Delhi in late fifties. She however worked as a Cardiologist predominantly looking after adults and did not have access to surgical management of cardiac patients. Late Dr. Vytilingam of Vellore also completed a year's training with Dr. Taussig in 1961. The first congenital heart surgery to be performed in India was a PDA ligation done by Dr. BR Billimoria at the Masina Hospital, Bombay. The first palliation for TOF was done in 1951 by Dr. Reeve H. Betts in CMC, Vellore in the form of a Pott's shunt. In 1953, Dr. P.K. Sen performed the first repair of coarctation of aorta in Bombay and followed that up with first successful direct vision closure of an ASD under hypothermia and inflow occlusion in 1956. He was also credited with concept of aortoarteritis in India, known as Sen-Kinare syndrome in late fifties. The etiology was thought to be of tubercular origin. This causative relation however did not withstand the test of time. Open aortic valvotomy under surface-induced hypothermia and inflow occlusion was performed by Dr. AK Basu in Calcutta in 1959. The first open heart operation to be done using cardiopulmonary bypass was an ASD closure by Dr. KN Dastoor at BYL Nair Hospital in Mumbai in 1961. In the same year, Dr. N Gopinath successfully closed a VSD using a pump-oxygenator in CMC, Vellore. The first total correction of Tetralogy of Fallot was done by Dr. R Padhi in 1963 at the Wanless Chest Hospital in Miraj. Other pioneers in those early years of cardiac surgery in India were Dr. NA Shah from Bombay Hospital and Dr. Stanley John from CMC, Vellore. Dr. K M Cherian from Railway Hospital contributed greatly to the

development of infant cardiac surgery in the late '70s and is credited with the first Senning operation in 1979 and arterial switch in 1984. The first successful rapid two-stage arterial switch was performed by Dr. KS Iyer in 1991 at AIIMS, New Delhi. Dr. R. Tandon joined A.I.I.M.S. in 1963 and devoted himself almost entirely to Paediatric Cardiology. Three Paediatricians with excellent training started works in Paediatric Cardiology almost at the same time. They were: Dr. Vishnu Jain of Patna, Dr. Bachu Edibam Master of Jamshedpur and Dr. S. K. Sanyal at Safdarjung hospital in Delhi. Unfortunately they did not have access to surgical help and the former two predominantly worked as Paediatricians and could not continue as Paediatric Cardiologists. Four other doyens Dr. CC Kar in Kolkata in mid sixties, Dr. IP Sukumar in Vellore and Dr. PS Bidwai in Chandigarh in early seventies need special mention because they propagated the concepts of Congenital Heart Disease and/or developed Paediatric Cardiology departments in their respective institutes. One of every 100 newborns has congenital heart disease and that almost 30–40% are lost in the first few months of life. Still there were no takers for this vast population of Cardiac patients. Dr. Raj Tandon single-handedly established the centre of excellence in Paediatric Cardiology at AIIMS in India and groomed the hemodynamic concepts amongst the students of Paediatric Cardiology. He always lamented about the paucity of centres as well as the number of Paediatric Cardiologists in India, which he attributed to near non-existence of dedicated cardiothoracic centres for paediatric patients. Dr. SS Kothari has carried his legacy forward. Over several years many others have joined the specialty but only after a considerable gap. The speciality is now a full grown one thronged by many operators and more and more participation of private as well as Government hospitals is happening in this direction. Projects supported by the various Governments have been a hit in taking care of this stream. Large departments of Paediatric Cardiology have specialists dealing exclusively with clinical work, diagnostic hemodynamic studies, intervention, echo and Doppler study, electrophysiology, pathology and more recently molecular Cardiology. Paediatric Cardiac Society of India (PCSI) founded in 1999 formed a platform for practicing paediatricians, physicians, cardiologists and cardiothoracic surgeons to deliver proper paediatric cardiology care and develop a proper scenario for training of post graduate students.

Echocardiography, the real stethoscope for cardiologists came to India for the first time in K.E.M. Hospital and Port Trust hospital, Mumbai in 1974–75, when only m-mode echocardiography was performed. Almost during the same period echocardiography machines reached Railway hospital at Perambur, Tamilnadu and several cardiologists from India got the first glimpse of the heart's motion, walls, vessels, valves, chambers and also their functional status. In mid to late eighties, the 2D echocardiography facility reached rest of India. Few papers began to be presented in the Annual Conference of CSI. Ten members in December 1994 at the conference at Chennai got together and formed the Indian Academy of Echocardiography (IAE) under the leadership of Dr. Savitri Srivastav and Dr. SK Parashar. Now there are facilities with both transthoracic & transesophageal approach for Doppler study, 3-D echocardiography, Fetal

echocardiography, Tissue Doppler Imaging, Strain Imaging and stress testing. Just to name the few doyens in the gestation period of echocardiography, Dr. Thanikachalam and Dr. Alagesan of Tamil Nadu, Dr. Sanjib Mukherjee and Dr. TD Bhattacharjee of West Bengal, Dr. SK Parashar of New Delhi, Dr. Vijayraghavan of Kerala, were instrumental in spreading the knowledge and use of Echocardiography across the country. A seminal paper, the first of its kind in the world on 3D echocardiography's role in detection of Masked CVD in metabolic syndrome.¹⁹

Rheumatic heart disease is still a major cardiovascular problem with debilitating effect in the age group of 20–40 years. Although many workers have studied the subject and presented data, few recent workers' names require special mention. They are Dr. I Vijayalakshmi who proposed 'Vijaya criteria for rheumatic fever' and Dr. A Saxena who brought 'subclinical rheumatic fever and heart disease' to prominence. Before the advent of percutaneous balloon mitral valvuloplasty, most patients with symptomatic MS were treated with surgical mitral commissurotomy, either open or closed. Dr. Stanley John from CMC, Vellore has reported the largest series (3748 patients) of Closed Mitral Commissurotomy.²⁰ However, by this time this unique technique was largely limited to Far East Asia, whereas in most of the other countries traditional cylindrically shaped balloons which were initially developed for pulmonary valvuloplasty, were utilized for mitral valvuloplasty. Lock et al in India first reported the use of such a cylindrical balloon for mitral valvuloplasty in 1985.²¹ In 1982, Kanji Inoue, a Japanese Cardiac Surgeon, first developed the idea that a degenerated mitral valve could be inflated using a balloon made of strong yet pliant natural rubber. Today, Inoue's single balloon technique has become the most popular method for performing BMV in India and other parts of the world afflicted by rheumatic heart disease.

Yoga, an ancient mind body technique is a holistic life style promoting physical, mental, emotional and spiritual well being. Prof S.C. Manchanda, an established cardiologist, has been the pioneer in propagating the concept in India and showed to the world through his team's research works in the catheterisation lab that Yoga and transcendental meditation can regress atherosclerosis and have significant role in the primary and secondary prevention of cardiovascular diseases.^{4,22} According to him, most of the cardiac diseases are in mind rather than in body. Positive energy in mind accompanied by life style modification can dispel the various life style diseases and should be inculcated right from the beginning of life. That is how the menace of cardiovascular diseases can be overcome reducing the huge burden of drainage of limited resources.

6. Concluding remarks

A man lives through his works. One's passion for works ultimately can offer breakthrough results which might be of immense importance to the people and the country. Man makes history by his perpetual desire to excel and contribute to the people. The history itself may appear mundane, but in the core of it is the advancement of civilisation through scientific methods year after year. The documentation many a

time may not be flawless in history as well as in science. Nobody should bother much for the shortcomings. Instead, all should attempt to explore the power of pen and paper (now LED screen, keyboard and mouse) to know and let know the truth.

‘Whoever wishes to foresee the future must consult the past; for human events ever resemble those of preceding times. This arises from the fact that they are produced by men who ever have been, and ever shall be, animated by the same passions, and thus they necessarily have the same results.’

- Machiavelli

Conflicts of interest

All authors have none to declare.

Disclosure

The manuscript represents collective memory of several cardiologists and some published literature, but it may fail to reflect memory of some others and therefore is liable to some inaccuracies and errors of omission. At the same time it is important to document what is known because it can serve as basis of reflective and philosophical history in future. We sincerely regret any omission and would be grateful if the same is brought to our notice. We would publish it in the next issue if evidence of the same is provided.

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