DONOR HEART HARVESTING – AN INDIAN PA’S EXPERIENCE

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Fortis Malar Hospital
Chennai

April 7, 2018
Greetings from Fortis Malar Hospital, Chennai!!!
DISCLOSURE

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• Trip has been jointly funded by APACVS, Fortis Malar Hospital and Self
OUTLINE

• Comparison of number of transplants world over and in India
• Organ donation rate
• Authority for organ allocation: NOTTO/TransTan
• The process involved
• How our team works
• Myriad role of a PA in a transplant unit
• Unique challenges in Indian scenario
• The future
REGISTRY DATABASE:
Number of Centers Reporting Heart Transplants

JHLT. 2017 Oct; 36(10): 1037-1079
### OUR EXPERIENCE

<table>
<thead>
<tr>
<th>Total number of transplants</th>
<th>221</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>184</td>
</tr>
<tr>
<td>Heart and Lungs</td>
<td>14</td>
</tr>
<tr>
<td>Isolated Lungs</td>
<td>23</td>
</tr>
<tr>
<td>Donor hearts harvested and not used</td>
<td>2</td>
</tr>
</tbody>
</table>

- **MY DONOR SITE EXPERIENCE: 135 cases**
ORGAN DONATION RATE

India’s organ donation rate is one of the lowest in the world.

- India: 0.26 per million
- USA: 26 per million
- Spain: 36 per million
ORGAN DONATION RATES IN INDIA
Tamil Nadu's organ donation rate a model for country

Tamil Nadu leads country in organ donation

Tamil Nadu launches app for organ donation
NATIONAL ORGAN AND TISSUE TRANSPLANT ORGANIZATION

ORGAN ALERT SHARED TO OTHER STATE IF THERE ARE NO TAKERS IN THE SAME STATE
TRANSTAN

• Transplant Authority of Tamil Nadu: Cadaver Transplant Programme, Government of Tamil Nadu: Tamil Nadu Network for Organ Sharing
• This Program is designed by a series of Government Orders issued by the Department of Health and Family Welfare
ROLE OF TRANSTAN

- Maintains national organ transplant waiting list
- Coordinates the matching and distribution of donated organs
- Coordinates arrangement of ‘Green’ corridor
- Collects and reports data on transplant recipients, donors and outcomes
THE PROCESS

Potential Donor

NOTIFY

TRANSTAN
(Age, Weight, Blood Parameters, Serology)

Alert

Hospitals with Registered Recipients

Coordinators
Send potential recipient list to TRANSTAN within 45 min

Doctors
Contact Donor hospital for medical details
HOW ARE ORGANS ALLOCATED?

- ABO blood group
- Time on the waiting list
- Nationality
- Geographical location
HOW OUR TEAM WORKS

Coordinator (Medical)
- TRANSTAN
- Medical team
  - Recipient list
  - Allocation
  - Follow up
  - Assessment
  - Harvesting
  - Recipient
- Patient (Recipient)
  - Information
  - Video consent
  - Preparation

Medical team

Coordinator (Admin) & team
- Donor Hospital
  - Cross match
  - Donor team
  - Green corridor
- Airport
  - Airport authorities
  - Security
  - Airline authorities
MYRIAD ROLES OF A PA IN A HTX UNIT

Multi Dimensional

DONOR AND RECIPIENT TEAM

POST OP ICU MANAGEMENT

IABP
ECMO
LVAD

PRE-OP:
WORK-UP, ECHO,
COUNSELLING,
LISTING

DISCHARGE
ADVICE
FOLLOW UP

LIAISON
BETWEEN
PATIENTS,
ATTENDERS,
CONSULTANTS
PRE-OP

**Pre-Transplant work-up**
- VO2 Max
- 6 min walk test
- Echo

**Counselling**
- Registering patients with TRANSTAN

**Stabilization**
- Ambulatory milrinone
- IABP
- ECMO
- Centrimag VAD
- F/U Deteriorating patients
- Handle re-admissions
- Coordination
INTRA-OP

Donor Team
- Assessment
- Donor Optimization
- Retrieval
- Transport
- Co-ordination

Recipient Team
- Recipient admission
- Preparation
- Consent
- Assist in surgery
POST OP

- ICU MANAGEMENT
- HANDLING IMMUNO-SUPPRESSANTS
- POST TRANSPLANT
- DRUG LEVELS TAC, MMF, CD COUNTS
- DOCUMENTATION PROGRESS NOTES
- DISCHARGE SUMMARY
- DISCHARGE ADVICE
- EMB SCHEDULING FOLLOW-UP
“CHALLENGES ARE WHAT MAKE LIFE INTERESTING AND OVERCOMING THEM IS WHAT MAKES LIFE MEANINGFUL.”

- Joshua J. Marine
CHALLENGES UNIQUE TO INDIAN SCENARIO

- DONOR HOSPITAL INFRASTRUCTURE
- DONOR MAINTENANCE
- CLINICAL DECISION MAKING
- LOGISTICS
DONOR HOSPITAL

- Physical presence
- Limited availability of equipments and manpower
DONOR MAINTENANCE

AIM OF OPTIMIZATION

• To maintain hemodynamic stability for optimal organ perfusion until organs are retrieved from brain dead patient
ORGAN DONOR – ISSUES

• **Cardiovascular**
  - Autonomic instability / Sympathetic storms
  - Hemodynamic instability / arrhythmias

• **Pulmonary** –
  - Neurogenic / cardiac pulmonary edema

• **Endocrine**
  - Hypothyroidism
  - Diabetes insipidus
  - Adrenal insufficiency

• **Others** – disseminated intravascular coagulation, hypothermia
DONOR OPTIMIZATION

• General maintenance of an organ donor
  ➢ Volume status
  ➢ Reversible causes – anaemia, hypoxia, acidosis & electrolytes
  ➢ Hormonal resuscitation

• Cardiac donor
  ➢ CVP < 10, MAP > 75
  ➢ Optimise SVR ~ 1200 to 1400
  ➢ Use Inodilators / inotropes / cut down vasoconstrictors
# CARDIAC DONOR CRITERIA

<table>
<thead>
<tr>
<th>Classical</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt; 45</td>
<td>Age up to 55</td>
</tr>
<tr>
<td>No known cardiac diseases</td>
<td>Treatable cardiac disease (ASD)</td>
</tr>
<tr>
<td>No history of chest trauma</td>
<td>No significant cardiac trauma</td>
</tr>
<tr>
<td>Stable hemodynamics</td>
<td></td>
</tr>
<tr>
<td>Inotropes &lt; 10 mics (dopamine, dobutamine)</td>
<td></td>
</tr>
<tr>
<td>Normal ECG</td>
<td></td>
</tr>
<tr>
<td>Normal Echo</td>
<td>LVEF &gt; 45%</td>
</tr>
<tr>
<td>No arrhythmias</td>
<td></td>
</tr>
<tr>
<td>Normal cardiac angiography</td>
<td></td>
</tr>
<tr>
<td>Negative serology</td>
<td>Sero positive recipient</td>
</tr>
<tr>
<td></td>
<td>Viral load – negative</td>
</tr>
</tbody>
</table>
# CARDIAC DONOR – CONTRAINDICATIONS

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 60 yrs</td>
<td>Systemic infection</td>
</tr>
<tr>
<td>LVEF &lt; 30%</td>
<td>Coexisting diseases (collagen vascular disorders, diabetes)</td>
</tr>
<tr>
<td>LVH &gt; 1.4 cm</td>
<td>Sero positive</td>
</tr>
<tr>
<td>Significant structural / coronary heart disease</td>
<td>IV drug abuse</td>
</tr>
<tr>
<td>Ischemic time &gt; 5 hours</td>
<td></td>
</tr>
<tr>
<td>Carbon monoxide poisoning</td>
<td></td>
</tr>
<tr>
<td>Malignancy with metastatic potential</td>
<td></td>
</tr>
</tbody>
</table>
LUNG DONOR

Assessment

- ABG
- CXR
- Bronchoscopy
- CT Chest

Lung is the most likely organ to be compromised in the organ retrieval process!
LUNG DONOR ISSUES

Conventional management of multi-organ donors
• Maintain BP/Abdominal perfusion
• Volume rehydration
• Inotropes
• Pressors
• Sterile precautions

Tends to trash donor lungs!
LUNG DONOR – MAINTENANCE

- General maintenance of an organ donor
- **Lung donor**
  - Aseptic precautions
  - Preventing aspiration
  - Frequent sterile suctioning
  - Bronchoscopic secretions / mucus plugs clearance
  - Regular recruitment manoeuvres
  - PEEP (5 TO 10), Tidal volume (7 to 10 ml/kg)
  - FIO2 as low as possible to maintain 95% saturation

Lung donor care starts with the admission of potential donor to the ICU and continues in the OR
CRITICAL DECISION MAKING!
DECISION MAKING FOR ORGAN ACCEPTANCE

• Borderline organs
  – Ventricular dysfunction
  – Myocardial stunning

• Coronary artery disease

• Mitral Regurgitation

• Transplant for congenital heart disease
  – Anatomy
  – Size matching
BORDERLINE DONORS

- LV function improved with Dobutamine
BORDERLINE DONORS

- 21 yrs male, initial echo had severe LV dysfunction (EF-20%)
- Added adrenaline & Dobutamine, stopped Noradrenaline
- It improved to 30% LVEF after 3 hours, still not fit enough to consider for transplant.
MYOCARDIAL STUNNING

DONOR

RECIPIENT AFTER 3 DAYS ON ECMO
VALVE REGURGITATION

MITRAL

AORTIC
OUR ORGAN CARE SYSTEM
CORONARY ANGIOGRAM
DONOR HEART HARVESTING
DONOR LUNG HARVESTING

- After sternotomy
  - Direct inspection and palpation for any mass/fibroids
  - Re-expand any areas of atelectasis – Manual inflation
- After heparinization
- Cardioplegia, Pulmonoplegia cannula
- Prostaglandin given directly into PA
- Aortic cross clamp, Vent, Flush in sequence
- Continue ventilation of lungs throughout
- Apply staples on trachea at end expiration
LOGISTICS 🤔🤔🤔
GREEN CORRIDOR!!

The Hindu

Tamil Nadu

‘Green Corridor’ for vehicles transporting organs

How ‘Green Corridors’ Are One Of The Most Revolutionary Yet An Underrated Initiative Of Indian Traffic Police
GREEN CORRIDOR!!
Green Corridor Slices Traffic to Get Hearts a ‘Home’ in The Nick of Time

Express News Service

Chennai: It all comes down to nine minutes. It takes years of experience, weeks of practice, hours of prep and several tense minutes of prayer to affect a heart transplant seamlessly. And sometimes, the difference between life and death can come down to whether the ambulance driver managed to get the harvested organ to the transplant centre in nine minutes, or less. And Fortis Malar hospital’s ambulance driver Kathir Velan made it as he drove the 19 km stretch from the Rajiv Gandhi Government General Hospital in the time that it would take most people to catch an English movie.

And most of it is courtesy the Chennai City Traffic Police’s Green Channel for organ transplants. Started in 2008 when the Tamil Nadu Organ Transplant Programme was initiated, the green corridor has held good over the year to such an extent that 75 hearts have been transplanted successfully, in the city’s major hospitals. “This is the only city that has this sort of a system in India and we must think of scaling it up and adopting it in other places as well,” says Dr K R Balakrishnan, who transplanted the heart from a 37-year-old diploma holder from Kancheepuram, Loganathan, to a 21-year-old patient in Kanchi.

One of the first times that the green channel was used was in 2008, when a heart was transported from Apollo Multispeciality Hospitals in Chennai to Frontier Lifeline Hospital in Mogappair in 14 minutes flat. “It is a great thing that we are not wasting an organ because of traffic,” Dr K M Cherian had told Express then. From then till now, all it takes is a quick call to the local Assistant Commissioner of Police to set things up.

The green channel owes its success to the transparency of the system, “All the 15 signals on Beach Road (Kamarajar Salai) are turned green and traffic is cleared on one lane. There is a pilot car in front of us that clears the traffic and we just have to follow him to the hospital for all the way to the hospital,” says Kathir, who has now transported hearts for five transplants, all of them successful.

What about excessive speeding? Kathir laughs before responding, “Today I drove at 100 kmph but sometimes it is more. There have been a few times when we have come close to hitting vehicles on the road, but we were fortunate,” he says.
FIRST INTERSTATE TRANSPLANT: DOCS, COPS ACROSS BORDERS WORK TOGETHER

Heart moves from Bangalore to Chennai in 120 minutes

Doctors and police from two cities worked seamlessly to transport a heart more than 400 km to save a life. In a little more than two hours, a heart harvested from a brain-dead woman in south Bangalore reached a patient in a hospital in south Chennai on Wednesday.

“This is the first time we are attempting an interstate heart transplant. A heart can be kept in cold storage for up to four hours, but we gave ourselves a window of three hours. In the end, it was done in two hours thanks to cooperation by police and airport staff,” said Harish Manian, facility director at Fortis Malar hospital in Chennai.

When the Air India flight took off at 3.20pm from Bangalore, doctors in Chennai started preparing the patient for the surgery. “It takes an hour for the prep, including administering anaesthesia and opening the chest. By the time we did that, the heart had reached the hospital,” said Manian. Five hours later, at 8.10pm, the team declared the surgery a success.

Everything fell into place for the recipient in Chennai. No one else on the waiting list in Karnataka met the requirements and the timing of the flight coincided with the time of the harvest. “The biggest drawback to interstate transplant is the timing of flights. Charter flights are very expensive,” said an official from the Tamil Nadu Organ Sharing Registry.

In the southern city of Bangalore, where traffic is always nightmarish, the heart had to travel 580 km from BGS Global Hospital in south Bangalore to Karpagam Hospital at the other end of the city. This was done in 45 minutes between 1.10pm and 1.55pm.

In Chennai, the ambulance was allowed through a special gate right up to the terminal to receive the heart after the plane landed at 4.10pm.

The traffic police took over and did it in style, regulating traffic and keeping all signals open for the ambulance to go past. “It took on seven minutes—4.10pm to 4.17pm—to cover the 12-km stretch between the airport and Adyar,” said a senior traffic official who was in charge of the planning.

Doctors said finding a perfect match for a heart transplant was extremely difficult. “The heart is a peculiar organ. Several parameters have to match, including the blood group, size and age. A lot of hearts are rejected because of this. Now that we have broken the logistical barriers between states, we can expect to do more such transplants,” said the official from the transplant registry.

As per an order issued by the Tamil Nadu government, the identity of either the donor or the recipients should not be made public before the date of discharge of recipients.
106 OUT OF 221 ORGANS WERE AIRLIFTED FROM OUTSIDE CITIES
HYDERABAD (ORGAN HARVESTED BY OTHER TEAM)
CHOPPER AIRLIFT
CHOPPER AIRLIFT
Heart from Kochi beats in Chennai

The Lifeline
Traffic police in Kochi and Chennai created green corridors as the organs were transported across busy corridors.

Times News Network

In an act that combined empathy, expertise and extreme coordination, the heart and lungs of a 19-year-old were flown from a Kochi hospital and transplanted in a 24-year-old patient from Maharashtra, in a Chennai hospital on Tuesday.

The transplant of the organs of Pranav, who was declared brain-dead after a bike accident, marked the first interstate transplant for Kerala and the third for Chennai. Traffic police in Kochi and Chennai created green corridors to ensure the organs reached the donor within four hours of them being harvested.

The process began minutes after Pranav was declared brain-dead at 10pm on Monday and his family conveyed to Lakeshore Hospital in Kochi their willingness to donate his organs. Kerala Network of Organ Sharing (KNOS) sent out an alert to hospitals. "There were no eligible patients in Kerala," said KNOS nodal officer Dr Noble Gracious. The alert went to the Tamil Nadu organ registry, and Fortis Malar Hospital in Chennai confirmed it had three patients on its list. A 12-member Fortis team including four doctors led by Dr K R Balakrishnan, director cardiac sciences, Dr K G Suresh Rao, Dr Muralidhar and Dr S K Chowdhury took a flight at 6.15am to Kochi. "They left with the organs at 11.58am," said Lakeshore managing director Dr Philip Augustine. Kochi city police created a green corridor, and they covered the 34km stretch from Nettoor to Nedumbassery in 30 minutes.

Airport formalities were cleared in a record five minutes, and the aircraft was on its way to Chennai where the patient was ready for transplant. "We got the message for a green corridor at noon," said a Chennai traffic police officer. The organs left Chennai airport at 2.11pm and reached Fortis at 2.20pm. The distance of 12km was covered in nine minutes.

The recipient was a 24-year-old man who had been on the waiting list for six months. "He had a congenital heart disease which eventually took a toll on his lungs as well," said Dr Balakrishnan. "We started the transplant at 2.30pm and completed the procedure by 5.15pm. It was a challenging procedure, but it was successful," said Dr Suresh Rao, chief anaesthetist at Fortis.

Pranav’s family donated five of his organs including liver, kidneys and small intestine.

(inputs from Sudha Nambudiri in Kochi, Janani Sampath & Karthikayan Renganathan in Chennai)
Chennai Hospital Gets Heart of Tirupur Brain-dead

Coimbatore: In a heart-pounding feat reminiscent of the thriller Chennaiyil Oru Naal, some of the organs of a brain-dead person were harvested in a private hospital here and successfully transported to four different hospitals for transplantation on Friday.

The harvested organs belonged to one T Mohanraj (26), a web designer from Tirupur, who was admitted in the Tirupur Government Hospital following a road accident near Koduvai on December 26. Mohanraj was then shifted to the G Kuppuswamy Naidu Memorial Hospital (GKNM), Coimbatore for further treatment the next day where doctors declared him ‘brain-dead’ on Thursday. Doctors began the organ harvesting process around 6.20 am on Friday and completed the procedure by around 10.30 am.

Traffic along the Avinashi Road was blocked for nearly 15 minutes to facilitate transport of the harvested heart from the hospital to the Coimbatore International Airport. The traffic police claimed it took exactly 5 minutes and 30 seconds for the ambulance ferrying the heart to reach the airport 8 km away from the hospital. The organ was airlifted to a private hospital in Chennai.

The eyes and the liver of the deceased were donated to other private hospitals in the city based on the Cadaver Transplant Program priority list. Sources said the liver was taken to PSG Hospitals in 2 minutes 30 seconds. Though both the kidneys were donated to two hospitals in Avinashi Road, doctors declared the organs damaged in the accident.
PRIVATE JET + CHOPPER AIRLIFT
India could revolutionise organ transport by using drone delivery

By Pavitra Dwibhashyam
Updated May 6, 2016 11:28 BST

International Business Times
Tale of the First Heart & Lung Transplant

OPINION | ANITHA CHANRASEKHAR

I love surgery, especially cardiac. It has a mysterious glamour attached to it. The king of all heart surgeries is the heart transplant. It involves a whole lot of science and skills making it a very intellectual experience. Having amassed quite a good experience in heart transplants, our team embarked on a journey to combined heart and lung transplant—a notch higher, as combined transplants are very challenging and demanding.

It was late evening when we received an alert about a heart and lung availability from a brain-dead donor in Guntur. All our team members were alerted. The initial assessment team left immediately in the night by road. After ascertaining the fitness of the organs, the harvesting team was supposed to leave next day mid-morning.

It was a beautiful dawn of a very crucial day for all of us. We were planning to do our first heart and lung transplant and we were air-lifting the organs from another state. The first time in the country. So we left the hospital around 11 am to board the aircraft at 12.

After 40 minutes of air travel, we landed at the Vijayawada airport. The hospital where the brain dead donor lived was a good one-hour drive from the airport. We reached there for the transplant of the organs to Chennai, reaching our hospital and completing the heart and lung transplant in the recipient.

After the heart and lungs were neatly packed in ice slush over three layers, it was safely placed in the ice box for the transit. As we rushed out of the Operating Room and changed into our civil dresses, we realised to our mighty surprise that heart and lungs when we arrived at the hospital with the organs. The recipient was a 20-year-old gentleman from Maharashtra suffering from a syndrome in which an untreated congenital heart defect led to high pressure in the lungs making the defect non-correctable and hence worsening the function of both the organs.

Our chief surgeon joined the team and performed the gentle prayer on the lips—the heart should start beating and the lungs should start breathing. After a few anxious moments, we arrived at the climax. The heart slowly and lazily started thumping as if it was waking up from a deep slumber and the ECG straight line started spiking indicating the beats. The heart lung machine was then gradually terminated and the heart and lungs started working wondrously. Half of the mission was accomplished. But there was still a long way to go to get the patient completely out of danger and back to normalcy.

The first 24 hours after any surgery is crucial as we need to scrupulously monitor any signs of rejection of the new organs. It needed close supervision, paying attention to detail and strict vigilance over the next three days after which we were finally able to get the patient out of the ventilator.

The Maharashtra chap had an uneventful recuperation over the next week in the ward. We all heaved a sigh of relief while the patient and family were eagerly waiting to get discharged and head back home. What, after seven months of residing in Chennai in the quest of an ideal donor, adjusting to the different language and place with the only anticipation of a miraculous life ahead, wouldn’t one just be more than keen on getting back to normal life and routine?

The writer is the Cardiac Surgical Associate at Fortis Malar Hospital in Chennai.
THE FUTURE

- Key role of PAs in heart failure unit
- DCD donors
- Innovative Organ care systems
SUMMARY

• Commendable organ donation and transplant program in India
• Organ donation awareness is increasing
• Meticulous & Optimal care of donor
• Organ focussed care – improves the availability of lungs & heart
• DCD donors
• Team approach – Donor management, Harvesting & Logistics
• Versatile role for PAs
• Way forward – Increase in number of centres, Harvesting & transport of organ & Organ care system
NO WORDS CAN THANK THEM ENOUGH.....
NO WORDS CAN THANK THEM ENOUGH.....
MY 100TH DONOR HARVEST RECIPIENT!