

RAY *of* HOPE

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**USE OF TECHNOLOGY
AND INNOVATIONS
IN TREATMENT**

Chairman

Dr. BS Ajaikumar
Chairman & CEO
HCG Enterprises Ltd.

Chief Editor

Dr. Bharat Gadhavi
Regional Director,
HCG Hospitals - Gujarat

Editor

Dr. D. G. Vijay
Consultant – Surgical Oncology
HCG Cancer Centre, Ahmedabad

Contributors

Dr. Kinjal Jani
Director - Radiation Oncology
HCG Cancer Centre, Ahmedabad

Dr. Diva Shah
Consultant - Radiology
HCG Cancer Centre, Ahmedabad

Dr. Sohil Vadiya
Consultant - ENT
HCG Hospitals, Ahmedabad

Dr. Jay M Shah
Consultant-Interventional Cardiology
HCG Hospitals, Ahmedabad

Dr. Anand Shukla
Consultant-Interventional Cardiology
HCG Hospitals, Ahmedabad



Dr. BS Ajaikumar
Chairman & CEO
HCG Enterprises Ltd.

Greetings from HCG!

I am glad to present the June edition of Ray of Hope.

In this edition, we have discussed about four case studies, wherein the latest technique and technology have played a crucial role in bringing better clinical outcomes. Here, you will read about - Caring for patients with Tomotherapy in an era of personalized medicine. The next article is about - PET - MRI fusion - new horizon in head & neck oncoimaging. The third article talks about - Foreign bodies in ear, nose or throat . While the last article will give an insights about - Intra Vascular Ultra Sound (IVUS) technique.

As a leader in healthcare it is our duty to educate, inform the patient about the disease, and explain to them with patience, using the appropriate terminologies. The aim should be to make them aware of the treatment and the outcome in order to eliminate the fear of disease. Understanding the psychology of the patient is very important by engaging in a detailed discussion with them and in due process, we are proud to achieve a better quality of life for our patients.

Until next time, I wish you good health!

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CARING FOR PATIENTS WITH TOMOTHERAPY IN AN ERA OF PERSONALIZED MEDICINE



Dr. Kinjal Jani

Director - Radiation Oncology
HCG Cancer Centre, Ahmedabad



- 360° targeting of cancer cells
- Multiple tumours can be targeted simultaneously
- Minimized damage to surrounding healthy cells
- Customized treatment delivery
- Non-invasive and painless procedure

Radiotherapy or Radiation Therapy is one of the important modalities in the management of cancer. The cancerous cells are killed with megavoltage X-Rays in Radiotherapy. It is used after surgery as an adjuvant treatment or as a lone modality as curative treatment. Some of the tumors may be treated with palliative intention too.

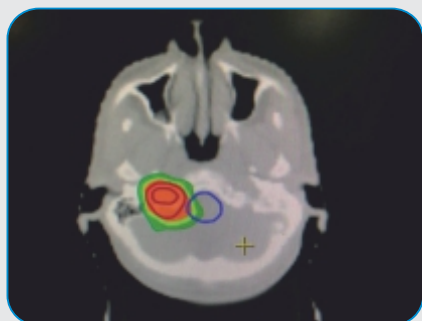
As like other treatments of malignancies, radiotherapy is also associated with some side effects. As surrounding normal cells get damaged by radiation, it produces unwanted side effects. To reduce these side effects lot of advancements happened in the Radiotherapy machines. The new advanced machine for Radiotherapy is called Tomotherapy H. This machine is currently the most conformal Radiotherapy equipment right now.

Tomotherapy looks like a CT Scan machine. The technique which is used by this machine is called Helical IMRT under image guidance. By doing Helical IMRT on Tomotherapy H, the dose to the normal tissues can be minimized and patient can tolerate the treatment better.

Tomotherapy can be used for any kinds of cancers. The main advantage of it is in the cases where a larger area needs to be given treatment or patients with multiple areas requiring radiation therapy at same time.

There are a few non cancerous conditions too where Radiotherapy can be used. Some brain tumors like Pituitary Adenoma, Schwannoma, Meningioma, Hemangioma, Craniopharyngioma etc can be treated with radiotherapy though there are benign.

Case Study



Case of jugular foramen Schwannoma treated with Tomotherapy

63 year old man was presented with giddiness and vertigo in 2016. He was evaluated with MRI of brain in June, 2016; which showed 2.3 X 2.8 X 1.3 cm size well defined mass lesion in Rt CP angle. He was treated with some medicines to relieve symptoms. He was fine till January, 2018. In January, 2018; he started experiencing tingling in right ear area and hearing impairment. MRI was done in March, 2018; which showed 2.7 X 2.5 X 3.1 cm mass in rt jugular fossa.

He was treated with fractionated radiosurgery on Tomotherapy in April, 2018. The dose of 25 Gy in 5 fractions was given. The patient is recovering well for now.

PET - MRI FUSION - NEW HORIZON IN HEAD & NECK ONCOIMAGING



Dr. Diva Shah

Consultant - Radiology
HCG Cancer Centre, Ahmedabad

The head and neck region have unique challenges for diagnostic imaging because of its anatomic complexity and associated functional processes.

Recently, PET-CT is being used widely for evaluation of head and neck malignancies – especially for metastasis of unknown primary, advanced head and neck cancers and in post treatment response assessment evaluation.

In recent times, fusion imaging (hybrid imaging) has evolved for more accurate diagnosis of cancers. PET-CT is often supplemented by MRI contrast imaging due to excellent soft tissue contrast resolution and aid of assessing cellular density by diffusion weighted imaging.

PET-MRI fusion is the current & latest hybrid imaging modality with a strong potential to provide added value over PET-CT or MRI alone.

Contrast enhanced PET-MRI imaging has higher diagnostic confidence for accurate lesion conspicuity (especially in the nasopharynx, oral cavity, larynx), infiltration of adjacent structures, recurrence, post treatment changes and importantly in evaluation of metastatic perineural spread.

The purpose of this case report is to provide comprehensive review of retrospective PET-CT with MRI fusion & its clinical implications in treatment planning as well as prognostication.

A 43 year old gentleman came to our hospital with ulcer in left buccal mucosa, biopsy showed moderately differentiated squamous cell carcinoma of left buccal mucosa.

His CT was performed outside which showed left highly suspicious malignant buccal lesion with left cheek edema.(Fig 1& 2)

Figure 1 & 2 –contrast enhanced coronal CT scan & coronal PET-CT showed malignant lesion in left buccal mucosa (Arrowhead and long arrow)

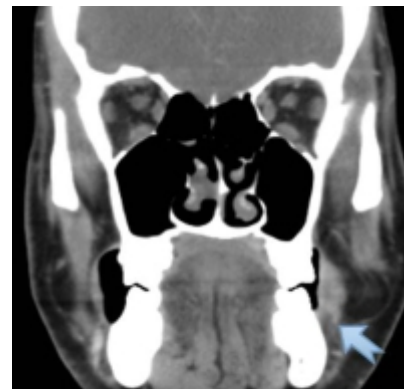


Figure 1

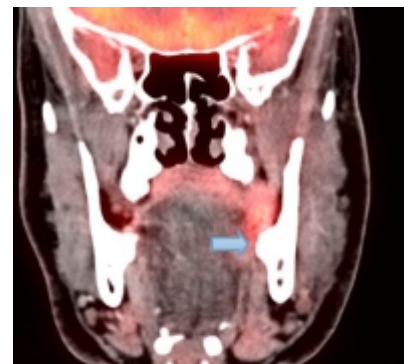


Figure 2

He was referred to our department for further evaluation with PET-CT with MRI fusion.

PET-MRI fusion showed metabolically active malignant lesion involving left posterior buccal mucosa, left posterior upper and lower GB sulci with low grade FDG avid abnormal thickening and enhancement of left inferior alveolar nerve in left mandibular canal and enhancing anterior V3 division of left trigeminal nerve suggest metastatic perineural spread with changes of acute denervation oedema of muscles of masticator space.(Fig 3 & 4)

Figure 3 & 4 PET-MRI coronal images malignant lesion of left buccal mucosa (arrow) and metastatic perineural spread along inferior alveolar nerve and in V3 division (arrow)

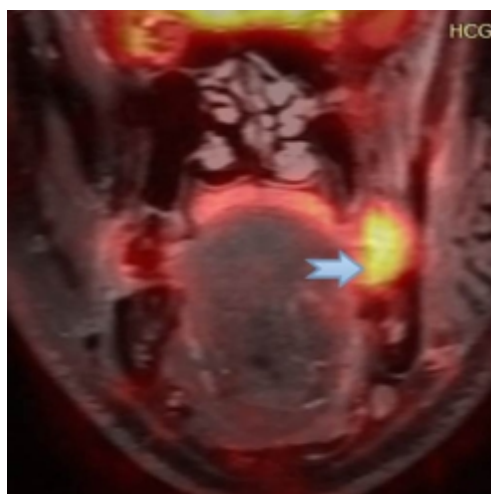


Figure 3

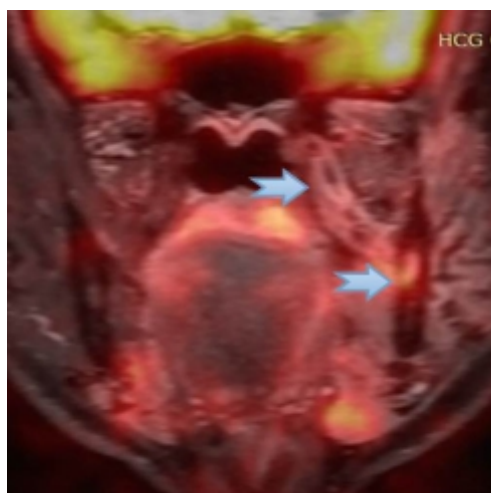


Figure 4

He was given 3 cycles of neo adjuvant chemotherapy due to diagnosis of metastatic perineural spread and follow up PET-MRI fusion showed residual small malignant lesion in left buccal mucosa (fig 5) and metastatic perineural spread along V3 division of left trigeminal nerve which showed regression in metabolic activity. Thus, he was subjected to concurrent CT & RT.

Retrospective fusion of PET-MRI is beneficial and very specific in case of perineural metastatic spread in oral cancers which changes the pre-treatment staging, treatment and prognosis.

Although integration of PET and MRI is a challenge technically because of use of different scanners, this new hybrid imaging modality holds promise because it can combine morphological, functional and molecular information at the same time.

Figure 5- post 3 cycles of neo-adjuvant chemotherapy coronal PET-MRI shows regression in left buccal mucosa malignant lesion

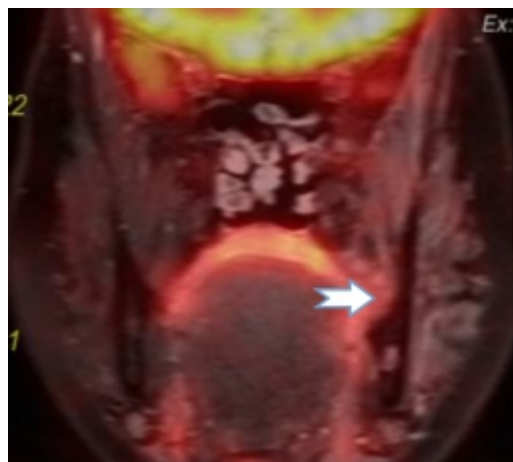


Figure 5

OUR DOCTORS' UNPARALLELED EXPERTISE WITH AN UNMATCHED TECHNOLOGY MAKES US LEADERS IN CANCER CARE



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DNB – Radiation Oncology
Consultant, Radiation Oncology

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- Multiple tumours can be targeted simultaneously
- Minimized damage to surrounding healthy cells
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FOREIGN BODIES IN EAR, NOSE OR THROAT



Dr. Sohil Vadiya

Consultant - ENT
HCG Hospitals, Ahmedabad

In day to day life, we come across many objects of varied materials. A foreign body is an outside object, living or non living, retained inside human body and it can create damage to tissues, if not removed. Food eaten is not a foreign body but a large bolus of food stuck in throat is a foreign body.

Certain foreign bodies are inert and harmless unless for long time, whereas some objects require urgent removal. Calcification develops around foreign bodies over long time if retained in body and adhesions to tissues also develop, so removal of foreign bodies should be as quick as possible. Button batteries are the most dangerous foreign bodies in nose or ear, as it can cause significant chemical damage to surrounding healthy tissues. As a preventive measure, it is advised not to give any object less than a fist's size to children less than 6 years of age.

With help of high definition endoscopes and microscope, it is possible to remove foreign bodies under direct observation, without inflicting much damage to the surrounding body tissues. Early diagnosis and precise management can certainly prevent significant damage/undesired consequences. In some cases, removal under general anesthesia may be required.

Foreign bodies in Ear:

While sleeping on floor live insects can crawl inside a person's ear or a mosquito or a housefly can go inside someone's ear. A child may insert small toy or food

grains in ear by mistake. Live insect can create lot of discomfort and noise in ear, and this may lead to panic/anxiety. Proper examination under microscope and removal under direct vision/magnification is the best management strategy for such conditions. Syringing with warm water for removal of foreign bodies had been popular as well. Grains or organic matter may swell up on coming in contact with water, so syringing in such situations must be avoided.

Foreign bodies in Nose:

Children may insert small objects in the nose while playing or sometimes food particles may be found in nose. Pieces of board chalk or small eraser, artificial pearls or game cookies are other common materials. Seeds of fruit may mistakenly be inserted in nose by children. Foreign bodies in nose can cause serious bleeding from nose as it is very vascular area. Rigid nasal endoscope gives the best visualization of nose's inside and helps in precise and complete removal of foreign bodies without much discomfort.

Foreign bodies in throat / esophagus:

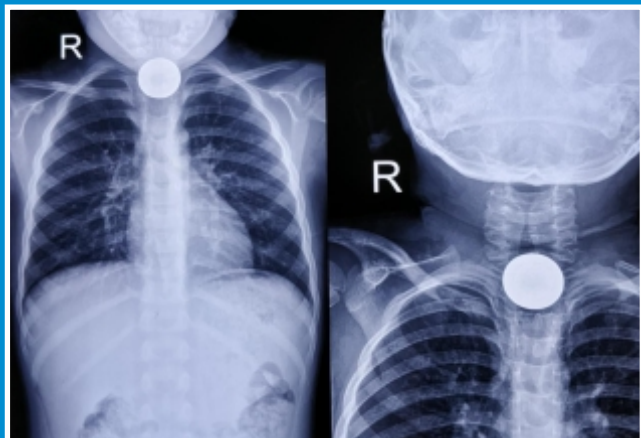
Fish bone, coin, safety pin, chicken bone, dentures, small stones, shells are some objects that may get stuck in throat, pharynx or esophagus. Cricopharynx / Hypopharynx is the most common site, as the cricopharyngeal sphincter keeps most foreign bodies above the upper end of esophagus. It is still not uncommon to find foreign bodies in mid - esophagus or lower esophagus areas. These foreign bodies have to be removed under general anesthesia. Strong history and constant discomfort/dysphagia are common complaints. Xray or flexible endoscopy can easily diagnose the condition. Cricopharyngoscope / Esophagoscope are very useful devices for removal of these foreign bodies. Sharp objects can cause perforation of esophagus if not removed early.

Foreign bodies in larynx/ trachea / bronchus:

This is in most cases an emergency situation. The patient may present with stridor /

breathlessness/respiratory distress. Seeds, beans, peanuts, pins or tablets are the most common objects. If very small, foreign body may remain silent, only to produce trouble later. Proper history is very important and on auscultation, air entry may be reduced on one or both sides of lungs. Laryngoscopy or Bronchoscopy under anesthesia and removal under direct vision is the mainstay of treatment.

A CASE DISCUSSION



A 5 year old boy came to HCG Hospitals with complaints of dysphagia and discomfort in throat with pain and a strong history of swallowing a 10 Rupee coin. The child underwent an X ray that showed presence of a coin, stuck in the esophagus near C7 spine level (See picture). Immediately, rigid esophagoscopy was carried out under general anesthesia in the operating room and the coin was successfully removed, giving a smile back on the worried mother's face. The child was absolutely alright after the procedure and started consuming full diet on the next day. Precise and timely intervention resulted in a favourable outcome.

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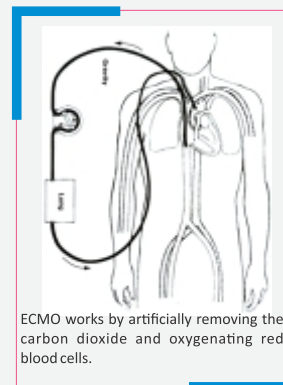
Which acts as lung & heart to deliver oxygen

Extra Corporeal Membrane Oxygenation (ECMO), also known as Extra Corporeal Life Support (ECLS), is an extracorporeal technique of providing prolonged cardiac and respiratory support to person whose heart and lungs are unable to provide an adequate amount of gas exchange to sustain life.

Indications of ECMO

- Swine Flu
- Pneumonia
- Lung Trauma
- Viral Myocarditis
- Poisoning
- Sudden Cardiac Arrest
- Heart Attack
- Bridge to Heart Transplant

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IVUS: INTRAVASCULAR ULTRASOUND



Dr. Jay M Shah

Consultant-Interventional Cardiology
HCG Hospitals, Ahmedabad



Dr. Anand Shukla

Consultant-Interventional Cardiology
HCG Hospitals, Ahmedabad

IVUS is used as an imaging tool over and above conventional coronary angiography. The conventional angiography reveals only the luminogram of the coronary vessels and doesn't give any information regarding intravascular pathology. IVUS gives information regarding intravascular structures like coronary intima, media and adventitia as well as plaque characteristic, amount of calcified plaques, total plaque volume and atheroma burden.

It also gives information regarding presence of thrombus, dissection, intraluminal hematoma etc.

IVUS should be used in following situations:

- Left main coronary artery lesion ambiguities as diagnostic tool
- Left main interventions should preferably done with IVUS guidance because it allows precise stent size selections and proper apposition after deployment will carry better long term outcome.
- All complex coronary interventions should be ideally done under the guidance of IVUS

If we look at the worldwide scenario, Japanese Interventional Cardiologists use imaging assisted

angioplasty very frequently with favourable cardiovascular outcomes.

IVUS guided interventions also saves contrast load especially in a Renalt compromised patients. IVUS can decide the location and distribution of calcium within the vessels and upfront usages of rotablator device for debulking of the plaque and modifications within the plaques.

Summary:

IVUS is a very useful imaging tool for the coronary angioplasty. It examines the vessels from within and give additional information over and above conventional angiography.

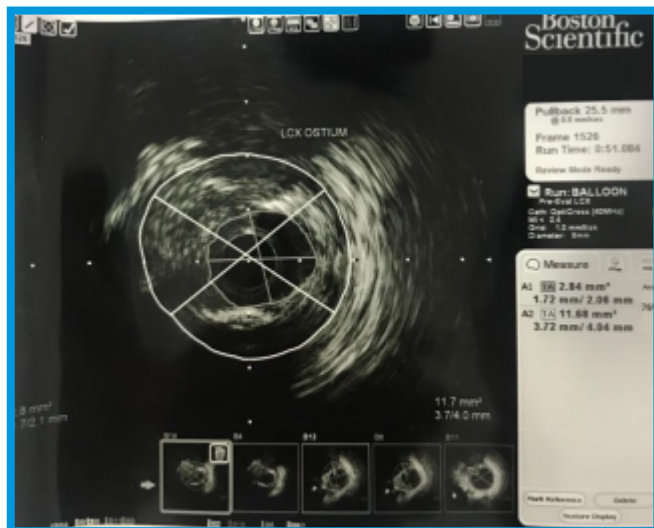
Its usage in complex coronary interventions and left main interventions have improved long term outcome comparable to coronary bypass surgery.

One should always use the technique and the technology to clear diagnostic dilemmas and improve long term clinical outcomes of complex coronary interventions.



A CASE DISCUSSION

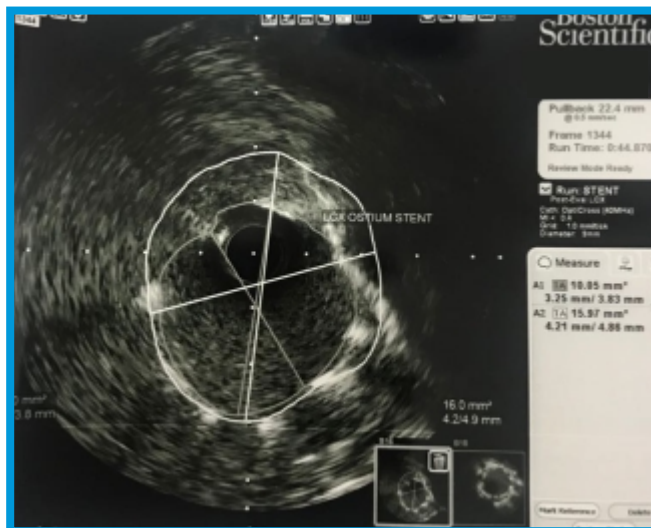
PRE SURGERY



A female of 68 years of age was presented with typical exertional angina (NYHA II - III) with underlying history of hypertension & dyslipidemia. We advised her routine cardiac blood investigations like cardiac enzymes, ECG, 2 D Echo & colour doppler. All cardiac evaluation tests were within normal limits but her ECG revealed subendocardial patterns in anterior leads. So, she was advised coronary angiography, which revealed 90% critical lesion at ostium of left circumflex artery with very short LMCA segment and ostial plaque at left anterior descending artery. Usually, this type of lesion is being recommended for CABG but apart from that we had given an option of Imaging Assisted Angioplasty in form of IVUS (Intravascular Ultrasound Guided PCI).

On explaining in details, the patient was ready for IVUS guided PCI, which revealed fibrofatty plaque along with calcification at 11 o'clock & 7 o'clock positions.

POST SURGERY



Immediately, the Minimum Lumen Diameter (MLD - 2.0mm) at LCX ostium was taken with reference diameter of 3.8mm at proximal part of LCX. Then, we decided to take cutting balloon - Flextome catheter to break the ostial lesion at LCX very precisely without any plaque shift.

After this debulking procedure, we choose to deploy 3.5 x 12 mm drug eluting stent at the LCX ostium. Then, the stent was again dilated with 3.5 x 8 mm NC balloon to achieve MLD - 3.8mm as per IVUS guidance. All the newer literature revealed that in such type of complex lesion, IVUS guided PCI always gives good long term cardiovascular outcome for the patients. IVUS guided angioplasty is recommended in all LMCA diseases, bifurcation stenting, chronic total occlusion PCI, graft vessel stenting and in stent restenosis as well; with accurate measurement of lumen area, lumen diameter, plaque morphology & stent apposition.



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IVUS (Intra Vascular Ultra Sound)

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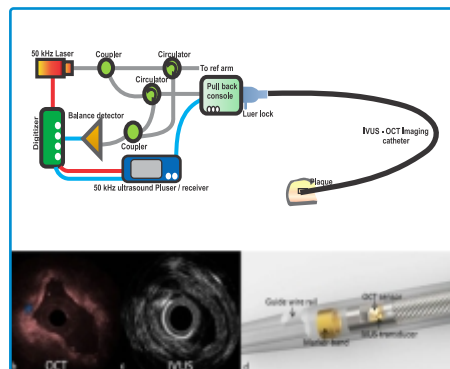
- Accurately measures lumen diameter and area

Clinical Utility for IVUS

- Over and above coronary angiography assessment of coronary arteries
- Intra-stent restenosis - visualize the stent
- Difficult to assess lesions - More sensitive plaque detection

Highly useful in all complex coronary interventions like

LMCA Stenting | Bifurcation Stenting | CTO | Graft Vessel Stenting | In-Stent Restenosis



Rotablation

- Treatment of challenging calcified lesion
- To prepare the vascular bed for better placement of the stent
- Very effective tool for treating calcified lesions



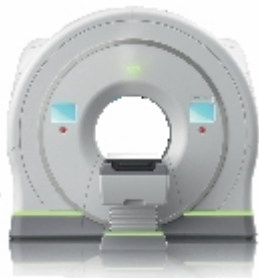
Team of Cardiologists

Dr. Jay Shah | Dr. Bhupesh R. Shah | Dr. Anand Shukla
Dr. Bhavesh Thakkar | Dr. Tarun Madan | Dr. Shaurin Shah | Dr. Jayesh Rawal

Department of CVTS

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HCG Hospitals, Mithakhali, Ellisbridge,
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Please write us : info@hcghospitals.in